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HIRSCH

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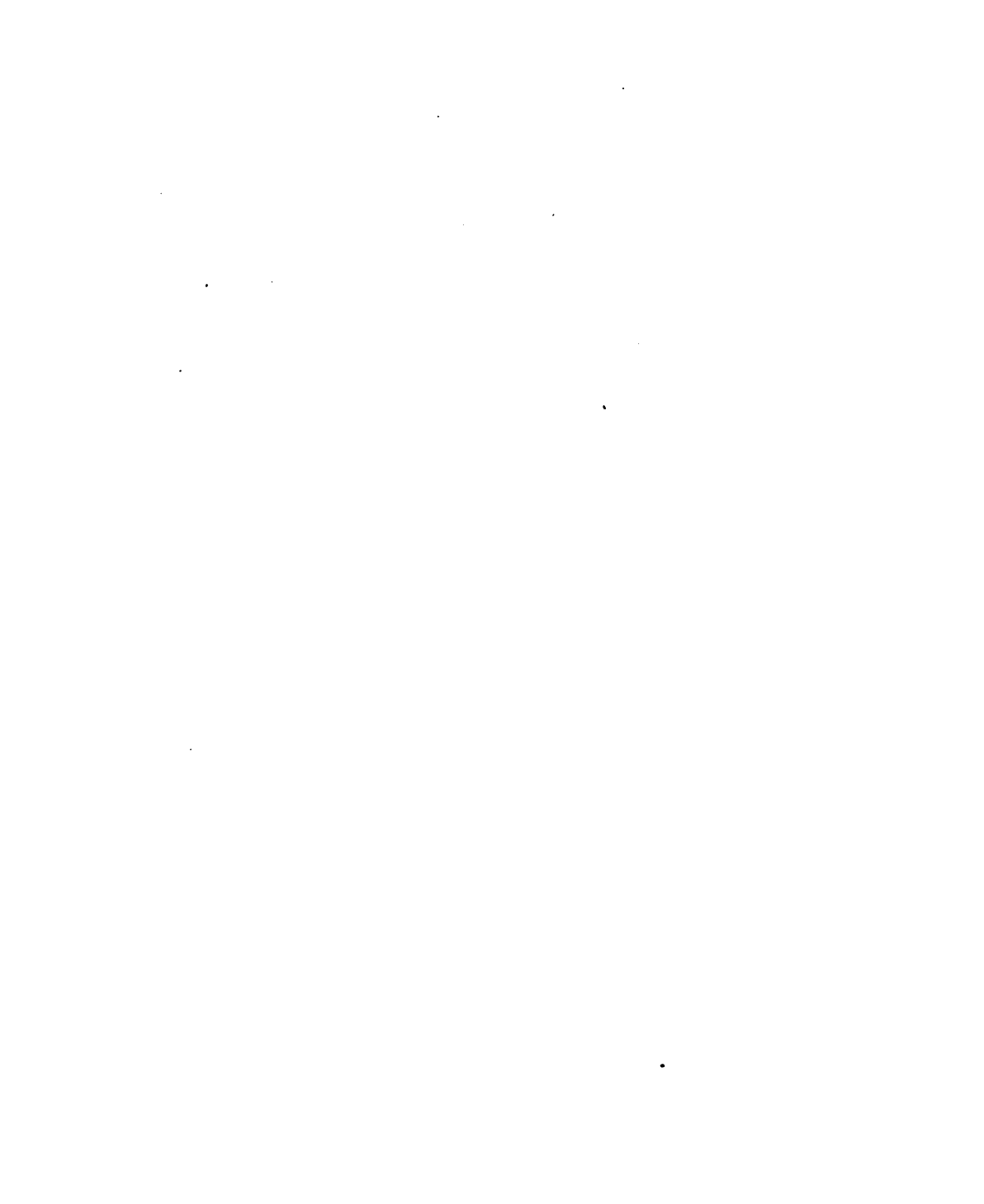
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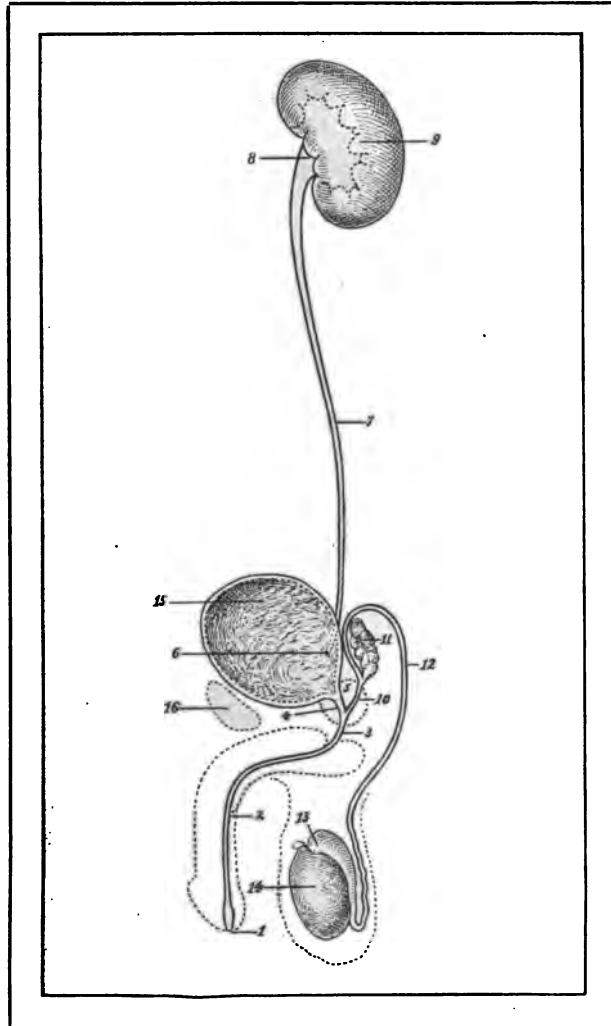
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Schematic drawing of the urogenital apparatus illustrating the routes by which the various structures are involved in ascending and descending infections.

- | | | |
|------------------------|-----------------------|----------------------|
| 1. Meatus urinarius. | 6. Ureteral orifice. | 11. Seminal vesicle. |
| 2. Penile urethra. | 7. Ureter. | 12. Vas deferens. |
| 3. Membranous urethra. | 8. Renal pelvis. | 13. Epididymis. |
| 4. Prostatic urethra. | 9. Kidney. | 14. Testis. |
| 5. Prostate gland. | 10. Ejaculatory duct. | 15. Bladder. |
| | 16. Os pubis. | |

BLAKISTON'S ?QUIZ-COMPENDS?

A COMPEND
OF
GENITO-URINARY DISEASES
AND SYPHILIS

INCLUDING THEIR SURGERY AND TREATMENT

BY

CHARLES S. HIRSCH, M. D.

ASSISTANT IN THE GENITO-URINARY SURGICAL DEPARTMENT
JEFFERSON MEDICAL COLLEGE HOSPITAL

ILLUSTRATED

PHILADELPHIA
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TO
ORVILLE HORWITZ, B. S., M. D.,
PROFESSOR OF GENITO-URINARY SURGERY,
JEFFERSON MEDICAL COLLEGE
THIS VOLUME IS RESPECTFULLY DEDICATED

53984

PREFACE.

The need of a book that epitomizes the mass of matter in the standard text-books was realized by the author in the course of his duties as quiz master.

To meet this need has been his aim, and he hopes that the book will facilitate the student in mastering the important points in the diagnosis and treatment of Genito-urinary surgery, venereal diseases and syphilis.

The author has striven to make more than a compend, as he knows that many practitioners will welcome a compact book that treats of these diseases tersely. He, therefore, has omitted unnecessary detail and the very rare affections.

A description of the surgical anatomy of the organs of the urogenital tract, precedes the technic of the various operations; and the newer aids to diagnosis, *e. g.* Cystoscopy; ureteral catheterization; cryoscopy—urinary segregation—X-ray, etc., are fully dealt with.

Likewise the subject of treatment, both medicinal and surgical.—The remedies and formulæ recommended are those advocated by the most eminent urologists and syphilographers, and used by the writer and his colleagues at the Jefferson Medical College Hospital.

To Casper's text-book of Genito-urinary diseases, Deaver's *Enlargement of the prostate*, Taylor's treatise of genito-urinary, venereal diseases and syphilis, the American text-book of Genito-urinary diseases—and to Fournier, Hutchinson,

Ricord, and other noted authors, the compiler cheerfully acknowledges his indebtedness.

His thanks are also due to Mr. C. V. Brownlow, of P. Blakiston's Son & Co., for his criticism and suggestions in the preparation of the volume.

If the amelioration of suffering and the avoidance of hereditary taint in the unborn are furthered by this little work, the author's task will not have been unavailing.

CHARLES S. HIRSCH.

332 S. Nineteenth St., Phila.

October 20, 1906.

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COMPEND OF GENITO-URINARY DISEASES AND SYPHILIS.

CHAPTER I.

EXAMINATION OF THE URINE.

General technic.—A specimen of urine submitted for examination should be taken from the total amount passed in 24 hours, which is collected in a perfectly clean vessel. Information should be elicited from the patient as to amount and kinds of food eaten, also of liquids drank, and the amount of exercise taken just prior to and during the collection of the urine, and also what drugs have been taken as medicine. In life insurance examinations the physician should satisfy himself that the specimen of urine presented is that of the applicant. Should it be inconvenient to test the urine as soon as it is received, and it becomes necessary to defer the examination for several days, or the specimen is sent to distant parts, a preservative may be added to the urine which will prevent decomposition, and at the same time, not interfere with the ordinary tests. Thymol is excellent for this purpose. About a grain of the crystals to the ounce of urine is sufficient. Chloroform and boric acid are also efficient preservative agents.

URINARY TESTS.

Reaction.—The reaction of the urine is determined by the use of litmus test paper. To apply the test, take a slip of the red and dip one end of it into the urine. The moistened paper will be colored BLUE if the urine be *alkaline*. If no change is noticed in the color of the dampened paper, use a strip of the blue in the same manner and if the urine is *acid* the dampened part will be changed to RED. If no change in color is effected in either instance, the urine is *neutral*.

The normal reaction of the urine is slightly *acid*, due to the presence of *sodium acid phosphate*. The change to alkaline reaction, when kept standing, is a kind of fermentation produced by the action of bacteria, the *micrococcus urae* being the principal one. In this fermentation, the urea is decomposed into ammonium carbonate, giving it the peculiarly putrid, *ammoniacal odor*. This is not a pathogenic change when taking place outside the body, but occurs in all urines.

Amount.—NORMALLY; 40 to 50 ounces in 24 hours, which is *increased* by ingestion of large quantities of liquids, and by chilling of the skin, whereby perspiration is diminished. Therefore, usually larger amounts are passed in winter than in summer.

DECREASED-NORMALLY.—In hypersecretion of the skin; and by small amount of liquids drank.

INCREASED-ABNORMALLY.—In diabetes insipidus and diabetes mellitus; in hysteria; and convulsive conditions; in cardiac hypertrophy; cirrhotic or amyloid kidney and pyelitis.

DECREASED.—In renal congestion, acute and chronic parenchymatous nephritis, acute febrile diseases, early stage of dropsy, and in diarrhoea.

Odor.—The odor of normal urine is characteristic, and may

be said to be slightly aromatic. It usually varies in intensity in direct proportion to the concentration of the urine. To what the odor is due has not yet been definitely ascertained. Certain foods, e.g., cauliflower, asparagus, etc., alter the smell of the urine; so do various medicines, such as turpentine, cubebs, copaiba, and sandalwood, the presence of which may be detected by the odor. In cystitis, retention, etc., it has the ammoniacal odor which is often fetid in character. When the urine is scanty in amount, it is generally "strong." In diabetes mellitus it usually has a sweetish, fragrant smell. Sometimes the underclothing in the immediate vicinity of the urinary organ, becomes soiled, and consequently offensive.

Color.—Altered in febrile conditions; hæmaturia; jaundice. By the use of senna, carbolic acid, logwood, creosote, rhubarb; santonin; etc.

DECREASED.—In excessive elimination of water by the kidneys, in diabetes mellitus, diabetes insipidus; polyuria, hysteria; interstitial nephritis; amyloid kidney. The color is now generally conceded to be due to the presence of *urobilin*. The intensity of the color is generally dependent upon concentration. The more urine excreted the lighter the color, and vice versa.

Active perspiration, food, medicine, and pathological processes, affect the color more or less. That of normal urine ranges from pale yellow to reddish-yellow. Turpentine makes it dark and gives it the odor of violets. Blood, if the latter is intimately mixed with the urine or has been in long contact with it, gives the urine a dull mucky or smoky hue.

Transparency and consistency.—Normal urine is transparent and clear when freshly voided. On standing a short time a faint cloud of *mucus* may be noticed near the bottom.

Abnormally, urine may be turbid or partially opaque from the presence of precipitated earthy *phosphates*; suspended acid *urates*; and the presence of *pus*, or *blood*.

Specific gravity.—The specific gravity of normal urine is between 1015 and 1025. That of urine passed by infants is low—1007 to 1012, while that of pathological urine may vary from 1001 to 1050. The urine of Bright's disease and diabetes insipidus is usually very low, but that of diabetes mellitus is high.

The specific gravity of urine is taken for the purpose of ascertaining the relative amount of solids contained therein, and is easily and rapidly determined by the use of the "urinometer." If the urine is very turbid, the sediment should be allowed to settle, or must be filtered. If the amount of urine is small, it may be diluted with one, or more volumes of water, carefully measured, and the specific gravity of this solution taken. The figure as read from the urinometer must be multiplied by the number of volumes of water used, plus one. For example, we have one-half ounce of urine, and have to dilute it to two ounces to get the specific gravity, which is found to be 1006. We have used one and one-half ounces of water or three volumes of water to one of urine. Now multiply the six by the number of volumes of water, plus one, and add the amount to the 1000, which will give 1024, the specific gravity desired.

Average composition of normal adult urine.—UREA and the CHLORIDES are the *chief solid constituents*. Therefore, variations in specific gravity of normal urine are chiefly owing to variations in these constituents.

INCREASED-NORMALLY: by excess of nitrogenous food; insufficient exercise in the open air; and diminished oxidation.

INCREASED-ABNORMALLY: In gout, rheumatism, hepatic disease, acute fevers, insufficient oxidation, e. g., in diseases attended by dyspnœa, in anemia, in the uric acid cachexia, etc.

DECREASED: In chronic Bright's disease, and diabetes mellitus.

Urea.—**INCREASED-NORMALLY:** By excess of nitrogenous food, and exercise in the open air.

ABNORMALLY: In febrile conditions in diabetes, epileptic attacks; by the ingestion of phosphorus, arsenic, and alcohol.

DECREASED-NORMALLY: During fasting; by the use of a vegetable diet, or lack of proper exercise.

ABNORMALLY: In diseases of the liver, acute yellow atrophy, carcinoma, etc.; faulty excretion due to renal disorders; gout; biliary colic.

FOWLER'S TEST.—To one volume of urine, in a suitable vessel, add 7 volumes of *Labarraque's solution*. Decomposition of the urea will commence at once, as will be noticed by the effervescence. Shake the vessel occasionally or stir with a clean glass rod and allow to stand for two hours, at the end of which time, all the urea will be decomposed. The difference in the specific gravity of the mixture before and after decomposition is taken and multiplied by 0.77 which shows the per cent. of urea, or roughly, the number of grains in 100 c.c. and from this, knowing the amount of urine voided, calculate the amount of urea passed in 24 hours.

Chlorides.—**INCREASED-NORMALLY:** By drinking abundantly of water; increased ingestion of common table salt.

ABNORMALLY: In the first few days after the crisis of acute febrile disease.

DECREASED-NORMALLY: During repose.

Phosphoric acid when it appears in the urine combined with calcium and magnesium forms the "earthy

phosphates" and with sodium and potassium "*alkaline phosphates*."

TEST.—Filter first if necessary, and ascertain the reaction. (If neutral or alkaline add a drop or two of acetic acid). Fill a test tube about half full of urine and add a few drops of ammonia solution, enough to make the urine distinctly alkaline and gently heat. The earthy phosphates will be precipitated.

ALKALINE PHOSPHATES.—Cloudy urine as a result of alkaline phosphates will clear with the addition of a few drops of acetic acid.

Indican.—The presence of indican as a constituent of the urine, is indicative of some impairment of the function of the upper gastro-intestinal tract. Any factor, preventing absorption of the products in the early process of digestion, will cause a marked increase in the amount indican in the urine.

The conditions in which this occurs are: Obstructive diseases of the bowels and other abdominal viscera; peritonitis; cholera; and cirrhosis of the liver.

OBERMEYER'S TEST.—The reagent is composed of strong hydrochloric acid, to which are added 2 parts per 1000 of *ferric chlorid*, the combination forming a fuming yellow liquid which keeps indefinitely. The urine should, preferably, be decolorized with a small amount of lead-acetate solution, as its pigments prevent the recognition of the blue color. Equal parts of urine and of Obermeyer's reagent are mixed in the test-tube, and about 2 c.c. of chloroform becomes blue in proportion to the indican present, increasing on standing. Normal urine becomes faint blue, while an increase of indican gives a deep color.

Gurber uses OSMIC ACID instead of ferric chlorid in testing for indican. A reagent glass is filled one-third full of urine and the glass is then filled with a concentrated solution of

hydrochloric acid, and two or three drops of a 1 per cent. solution of osmic acid are added. In a few seconds the fluid turns violet or almost pure blue, according to the proportion of indican.

ABNORMAL CONSTITUENTS.

Albumin.—It is claimed by many observers that the presence of albumin in the urine is always a pathological symptom, while others maintain that it may under certain conditions,—e. g., excessive ingestion of albuminous foods, eggs, etc., excessive exercise, over stimulation from alcoholic excesses—be present in health, in which cases it is always transitory. *Albuminous urine is usually of low specific gravity (1002-1016).*

The amount passed in 24 hours varies according to the severity of the case. The percentage varies from 1-10 per cent. to 2 per cent.

HEAT TEST.—Filter the urine if it is turbid. If acid, it may be simply boiled in a test tube. The presence of albumin will be indicated by an opalescence, a cloudiness, or a precipitate, due to the coagulation of the albumin, which if slight may be best seen by holding the test tube against a black ground such as the coat sleeve. If the urine is alkaline or neutral in reaction, a drop or two of acetic acid must be added before applying the test, or if excessively acid just a drop or two of some alkali, such as ammonia.

HEAT AND NITRIC ACID TEST.—This is probably one of the most satisfactory tests for albumin. Place in a test-tube about 8 or 10 c.c. of urine and heat to boiling. Then add 10 or 12 drops of nitric acid. The presence of a small amount of albumin is shown by a slight diffuse cloudiness, a larger amount by a more or less flaky desposit.

Copaiba and *turpentine* in the urine may give a reaction with this test. They may be distinguished by being dissolved by the addition of alcohol. Unless nitric acid is added in the heat test, the precipitation of earthy phosphates may simulate the reaction of albumin.

QUANTITATIVE TEST.—Esbach's albuminometer consists of a thick graduated test tube and is designed for the easy quantitative determination of albumin. It is cheap and its manipulation is simple. Directions for use accompany each one.

Glucose.—(GRAPE SUGAR, DEXTROSE, DIABETIC SUGAR). The question as to whether glucose ever occurs in the urine of healthy persons is still unsettled, but the consensus of opinion seems to favor the view, that it may be found in small quantities under certain normal conditions. However, when sugar is persistently present, in the urine it is *abnormal*. Glucose may be found in the urine in small quantities after excessive ingestion of sugar. In diabetes mellitus, constant glycosuria is a diagnostic symptom. The urine in this disease is usually light in color; is passed in large quantities (polyuria) from 5 to 40 pints in 24 hours; is of high specific gravity, 1.025 to 1.045; has a sweetish odor; and, rapidly ferments when kept in a warm place. A persistent foam readily forms on shaking the urine. On standing a while the surface of the urine usually becomes covered with a thin, almost imperceptible, scum. The amount of sugar present varies from 1 to 30 ozs., in 24 hours' urine. Glucose has been observed in the urine of other pathological conditions, e. g., lesions of the brain; diseases of the heart and lungs, cholera; after chloroform narcosis, etc.

FEHLING'S TEST.—Fehling's solution used in this test, deteriorates on standing, and hence, for preserving, it is best

made in two parts and kept in separate bottles. In this way it may be kept indefinitely.

In one bottle keep the following (No. 1).

Pure copper sulphate	17.32 gms.
Distilled water	250.00 c.c.

In another bottle (No. 2).

Rochelle Salt	87.00 gms.	Fehling's
Caustic soda	25.00 gms.	Alkaline
Distilled water	250.00 c.c.	Solution

To apply this test, mix in a test-tube equal volumes of No. 1 and 2, dilute with equal quantity of water and boil. No precipitate should be noticed. Now, slowly add to this mixture half its volume of urine and again boil. The presence of glucose will be indicated by an *orange or red-colored precipitate*. The earthy phosphates may be thrown down, but are not red in color.

Biliary pigment.—Biliary coloring matters occur in the urine in different forms of icterus. The color is yellowish-brown, deep brown, greenish-yellow, or nearly pure green. The urine foams easily on shaking, and the foam possesses a yellow to green tint. The sediment usually present in icteric urine also partakes of the biliary colors.

GMELINS' TEST.—(Rosenbach's modification). Filter the urine. Apply to the filter, after the urine has passed through, a drop of nitric acid. A pale yellow spot will be formed, surrounded by a play of colors,—red, violet, blue and green.

HELLER'S TEST.—Pour in a test tube half an inch of pure hydrochloric acid and mix enough urine with the acid to discolor it, then carefully pour nitric acid down the sides of the test-tube so as to form a layer underneath. A beautiful play of colors takes place at the union of the two liquids.

Urinary sediments.—Normal urine when voided is per-

fectly clear, but after standing a few hours, a light cloud of mucus may be seen floating near the bottom. The urine undergoes *acid fermentation* which is observed, if the urine is exposed to a low temperature. A reddish-yellow precipitate of amorphous urates "*brick-dust deposit*" will form. At a warmer temperature and at the climax of acidity of the urine, the urates may become decomposed and uric acid precipitated. Following the acid fermentation the urine later gradually becomes alkaline.

The sediment of abnormal urine is evident by the turbidity of the urine when passed, or its becoming so, and exhibiting a precipitate shortly thereafter.

The identification of ORGANIZED SUBSTANCES, e. g., *mucus*, *blood*, *pus*, and *fat*, by chemical means is very unsatisfactory.

Mucus.—If there is a distinct but translucent cloud suspended near the bottom of the urine after standing, and after some of the supernatant urine has been carefully removed the remainder is slimy, an excess of mucus is indicated. On standing the urine, the mucus mixes with it; almost disappear from sight. Large quantities of mucus are usually accompanied by pus. The absence of albumin, a constituent of pus, but not of mucus, will prove the absence of pus.

Pus.—Pus in the urine (*pyuria*) is generally due to some acute or chronic inflammatory process present in the urinary tract, such as pyelitis, renal abscesses, cystitis, prostatitis, urethritis (gonorrhoeal or simple), and genito-urinary tuberculosis, or it may come from some extraneous source, as the discharge into the urinary canal of the peri-nephritic, pelvic or other origin, or from the bursting of a vulvo-vaginal abscess. Cancer of the bladder or other urinary organs is also a frequent source of pyuria. It is essential to a correct diagnosis that the source of the pus be ascertained. Some indications that

point to the source:—If in micturition, the pus passed in the beginning of the act is more abundant than toward the termination, the pus comes from the urethra, if more abundant toward the end of micturition, from the bladder. Urine containing pus from the kidney or urethra is usually acid in reaction, while that containing pus from the bladder is usually alkaline and is often accompanied by a large quantity of mucus. If blood be present it will be intimately mixed with the pus, while if of renal origin, the blood usually lies on top of the pus.

In prostatitis, the urine often contains pus, appearing in the form of threads, very similar to "*tripper-fäden*."

Urine containing pus is always turbid on being voided, but, after standing for some time in a vessel the pus sinks to the bottom, and in alkaline urine, is tenacious and slimy. This sediment varies in color from yellowish-white to greenish-white and is opaque. The only positive method of determining the presence of pus in the urine is by means of the centrifuge and microscope.

Blood.—The urine may contain blood (**Hematuria**) as a result of hemorrhage in the urethra, at the neck of the bladder; in the ureters; the pelvis; or substance of the kidney: or it may gain entrance to the urine from external sources.

If the blood comes from the urethra it is generally due to gonorrhœa or stricture, and if it comes from the anterior part, it escapes, by compressing the urethra. This blood is bright red in color. If derived from the prostatic urethra, it appears during urination. The introduction of instruments, and forced or excessive coitus may cause urethral hemorrhages. The color of the blood contained in the urine is of significance in the determination of its source. Blood on long contact with urine becomes dark

on account of oxidation, so in renal hemorrhage, where the urine is intimately mixed with the blood and where the contact is more or less prolonged, we find the blood of a dark red, reddish-brown, brown or dark brown color. Albumin which is a constituent of blood is also present in hematuria.

TEST.—The microscopic and spectroscopic tests are the most satisfactory.

Casts.—The exudate from the kidney tubules, molded to the form of the lumen of the tube, are often seen in the urine under certain conditions:—They consist largely of hyaline material and are colorless and transparent. Very frequently, however, they may be observed as waxy or opaque bodies, with or without other elements. Should these contain extraneous bodies, they are designated accordingly. The usual forms of casts are:

Pure <i>hyaline</i> ,	<i>Waxy</i> ;
<i>Epithelial</i> , (with epithelium adherent thereto);	<i>Blood</i> ; (casts with adherent blood corpuscles;)
<i>Fine</i> or <i>coarsely granular</i> ;	<i>Fatty</i> , (adherent fat globules;)
<i>Brown granular</i> , (stained with blood pigment);	<i>Fibrinous</i> (hyaline non-granular, pigmented cast).

Casts vary in size, are cylindrical in shape and may be easily recognized.

The presence of casts means renal congestion which may be temporary or permanent. **HYALINE** casts are a significant of passive renal congestion or chronic affection. The **GRANULAR** casts may be found in renal diseases but may appear during convalescence of acute nephritis. **BLOOD** casts are frequently associated with nephritis due to traumatism either internally (*calculus*), or externally. The **FATTY** casts are found in the chronic parenchymatous forms of nephritis.

The WAXY casts are found in far advanced renal diseases and especially in amyloid kidney.

Epithelia.—The presence of epithelia in the urine is very significant and always of great diagnostic importance, when their characteristics in different parts of the tract are understood. The coarser cells are in the anterior urethra and become finer and more delicate as they approach the kidney. Epithelial cells also vary in their properties in the different layers of the same mucous membrane. The outer layers contain the *coarser* cells and the deeper layers, the *finer*. Epithelium from the tubules of the kidney are *round* and smaller than those from the pyramids. They contain large nuclei which distinguishes them from the pus cells. Chronic inflammation of the pelvis of the kidneys (chronic pyelitis) gives off small round epithelial cells which may be distinguished by the co-existence of blood and pus in the urine. Epithelium from the ureters are rarely found, but may occur as the result of a passing calculus. These cells are *spindle shape*. Cells from the bladder are two or three times as large as other cells and irregular in outline.

Prostatic secretion is recognized floating in the urine, being of a very dull light color and stringy in appearance. Usually results from sexual excesses and prostatic congestion. Should pus collect it is significant of a gonorrhœal prostatitis.

Testicular and seminal vesicular secretions do not appear in the urine unless together, hence in the presence of the spermatoza they may be recognized. (Fig. 1.) They are



FIG. 1.—HUMAN SPERMATOA. 1. Surface view. 2. Side view. 3. Looped seminal filament. 4. Spermatozoon of an ox. *a*. head. *b*. middle piece. *c*. tail.—(Radasch.)

usually indicative of spermatorrhœa and seminal vesiculitis.

Pseudomembrane sometimes appear in the urine and are easily recognized. They are in most cases from a new growth somewhere in the genito-urinary tract, and are also commonly found in certain forms of cystitis.

Filaria sanguinis hominis and echinococcus cysts are occasionally found in the urine, but are very rare.

Bacteria.—The forms of bacteria most commonly present in the urine are the *bacillus coli communis*, *bacillus tuberculosis* and the *gonococcus*.

TECHNIC IN EXAMINING FOR TUBERCLE BACILLI IN THE URINE.—The specimen should be centrifuged, the sediment removed by a pipette, and placed on a slide, which is immersed for 10 minutes in a solution of:

Fuchsin	1 gm.
Alcohol 95 per cent	10 gm.
Carbolic Acid 95 per cent	5 gm.
Distilled water	100 gm.
Then thoroughly wash, dry with blotting paper and immerse in	
Methylene Blue	2 gm.
Sulphuric acid	25 gm.
Distilled water	100 gm.

Until sufficiently blue, then dry and mount, examine with 1-12 oil immersion lens. Tubercular bacillus is *red* and all else will be found blue.

WEICHELBAUM'S METHOD of staining tubercle bacilli is a slight modification of the above and is especially adaptable in distinguishing it from the smegma bacillus which stains in a similar manner with the fuchsin. In this method it is decolorized with absolute alcohol and counterstained with an aqueous solution of methylene blue.

The **Smegma bacillus** is an acid-fast organism, which may

lead to the gravest mistake in the diagnosis of genito-urinary tuberculosis. This organism was first discovered as a result of the investigations which followed the announcement by Lustgarten of his discovery of the cause of syphilis. Whether or not the Lustgarten bacillus and the smegma bacillus are identical, is still more or less a matter shrouded in mystery, though it seems likely that the organisms are the same. With the ordinary methods of staining it resembles the tubercle bacillus. Of especial importance is the fact that the smegma bacillus is found, often in large numbers, beneath the prepuce in the male, and about the vulva and clitoris in the female, and that from these places it can gain entrance into the urine and thus be mistaken for the tubercle bacillus.

The smegma bacillus can be differentiated from the tubercle bacillus both morphologically and by its staining reactions. In the majority of cases an experienced bacteriologist can probably differentiate between the two organisms, but there are cases in which such differentiation is impossible except by animal inoculation, and even this occasionally fails.

Ehrlich's diazo reaction.—The diazo reaction as a urinary test is of great diagnostic value in typhoid fever and tuberculosis. The diazosulphbenzol must be freshly formed. To obtain it in this state it is convenient to keep two separate solutions:

Solution No. 1.

Sulphanilic Acid	1	gm.
Hydrochloric Acid	25	c.c.
Distilled water	500	c.c. Mix.

Solution No. 2.

Sodium Nitrate	0.5	gm.
Distilled water	500.0	c.c. Mix.

To perform the test mix well 50 parts of solution No. 1 (say to 50 c.c.) and 1 part (1 c.c.) of solution No. 2. Take equal parts of this mixture and of urine in a test tube and add stronger water of ammonia until the alkaline reaction is very strong. In those cases in which the reaction is positive the solution assumes a carmine-red color, which on shaking must also be visible in the foam. If the test is allowed to stand 24 hours a greenish precipitate is formed. The earthy phosphates are precipitated by the addition of the ammonia.

Fat, contained in the urine (**lipuria**), may be detected by the following method:—The turbid urine is thoroughly shaken in a test tube, and an equal volume of ether added. Shake, cork and set aside to settle. Carefully pour off the ethereal solution, which floats on top, into an evaporating dish or beaker and set aside, allowing the ether to evaporate. The residue will show whether fat or oil matter is present. Fat thus demonstrated in a milky, opaque urine is usually indicative of *chyluria*.

URINARY CALCULI.

If the calculus originates and develops in undecomposed urine it is said to be *primary*; if, on the contrary, the calculus is a product formed by urine which has undergone ammoniacal decomposition, it is said to be *secondary*. If the calculus is composed of one constituent only it is a **SIMPLE CALCULUS**; of two or more ingredients it is a **COMPOUND OR MIXED CALCULUS**.

COMPOSITION.—They are most commonly composed of uric acid, urated calcium oxalate, “mulberry calculus,” mixed calcium and triple phosphates, calcium phosphates, calcium carbonate, xanthin, urostealith “fatty calculus,” *singly or a combination of two or more of these*.

GENERAL CHARACTERISTICS.—Urinary calculi are usually composed of two or more substances arranged in separate and alternate layers, which may be seen by carefully dividing the calculus through its center with a small saw. (See Chapters Renal and Vesical Calculi.)

Uric acid calculi.—These are the most frequently found (30 per cent.) of all calculi. They are reddish or reddish-brown, usually smooth, but may be irregular. May occur in any size up to a goose egg, and vary in weight from 5 milligrams to 150 grams. They are hard, but not so hard as those composed of calcium oxalate, are of round or oval shape, and when divided, usually present a stratified appearance.

TESTS.—A small portion of the calculus burned in an alcohol blaze gives off the odor of burnt corn, and leaves only a faint trace of ash after ignition. A portion of the calculus will respond to the MUREXID TEST. Another small particle will dissolve entirely in a drop of solution of caustic potash and will be precipitated by an excess of acetic acid.

Uratic calculi.—These are composed of ammonium urate. They are rare and are found usually in infants and children. They are dark gray or whitish, when moist are pliable, and when dry are friable.

Calcium oxalate (oxalate of lime) calculi—are next to the foregoing most frequently found. They form about 20 per cent. of all calculi, and are the hardest of any. They occur in both round and oval forms; their surface is rough, and is of a dark gray, dark purple or dark brown color. These calculi may occur in the form of a small, rounded, smooth bodies, which are known as "hempseed" calculi, and in other cases assume the so-called "mulberry" type. Calcium oxalate calculi often have a coating of phosphates.

TEST.—A particle of the calcium oxalate is insoluble in

acetic acid, but is soluble in a drop of hydrochloric acid with effervescence when heated. Ammonia solution added in excess will precipitate the calcium oxalate.

Mixed phosphate calculi.—The most common form of mixed phosphate calculi are those composed of a mixture of calcium phosphate and of ammonio-magnesian phosphate. They are always a product of the ammoniacal decomposition of the urine whereby the earthy phosphates are precipitated. These calculi are generally oval shape, are chalky in appearance, and are usually friable. When divided in half the interior is found to be *laminated*, and here and there shiny points of triple phosphate crystals may be seen. These calculi frequently attain a large size.

TEST.—A particle of this concretion will readily dissolve in a drop of hydrochloric acid, and will be precipitated by adding excess of caustic soda solution.

Calcium phosphate calculi.—These are rare. They have a smooth white surface. Their laminæ are easily separated, peeling off like crusts. These calculi are sometimes found in the prostate gland, and are then known as “prostatic calculi.”

A convenient and complete record may be obtained by the use of the following form:

URINALYSIS RECORD.

DATE.....
 NAME OF PATIENT.....
 ADDRESS.....
 SUSPECTED AILMENT.....

PHYSICAL PROPERTIES.

Amount passed in 24 hours..... Color.....(*Vogel's Scale.*)
 Odor..... Reaction..... Sp. gr.....
 Relative quantity of sediment.....
 Physical character of sediment.....

Chemical Examination.

Normal constituents.....
 Uric acid and urates..... Chlorides (Quantitative.).....
 Sulphates..... PHOSPHATES { Earthy.....
 Urea..... { Alkaline.....

Abnormal Constituents in Solution.

ALBUMEN, (Qual.) { *Heat Test*
 { *Tanret's Test*.....
 { *Copper Test*.....
 SUGAR, (Qual.) { *Phenyl-hydraxin Test*.....
 { *Fehling's Test*.....
 Biliary Matters.....
 Indican.....

Composition of Sediment.

Blood..... Pus..... Mucus..... Uric acid.....

Microscopic.

CASTS. { *Epithelial*.....*Finely Granular*.....
 { *Narrow hyaline*.....*Dark Granular*.....
 { *Medium hyaline*.....*Bloody*.....
 { *Broad hyaline*.....*Amyloid*.....
 FALSE CASTS. { *Cylindroids*.....
 { *Small Round*.....
 EPITHELIA. { *Spindle Form*.....
 { *Pavement Form*.....
 Pus..... Erythrocytes.....
 Uric acid..... Triple Phosphates.....
 Amorphous Urates..... Micro-organisms.....
 Remarks.....
 Conclusions.....

CHAPTER II.

URETHRITIS.

Urethritis is a generic term, including all forms of inflammations of the urethra, and is pre-eminently a disease which may be said to flourish among the younger element of the male sex. It is by far the most frequent affection of the genito-urinary tract, and is very rarely acquired from any other source than by sexual contact. It is highly infectious involving particularly the mucous membrane of the urethra. The most common term for this condition in all its phases is **gonorrhœa**. That urethritis is not merely a local affection will be seen in the succeeding chapters in which the complications occurring in both sexes will be considered. It is much more common in males than in females.

The first attack is more acute in its symptoms, than subsequent invasions. The symptoms in females are much less acute than in males. The most frequent exciting cause is the gonococcus, but urethritis may occur as the result of infection from other micro-organisms. The type of the disease in which the gonococcus is a causative factor constitutes the *specific form*, whereas, urethritis occurring from sources other than the specific organism, is termed the *non-specific* variety.

The different varieties of urethritis have been classified by Lydston, as follows:

Acute and chronic	(a) Simple	{ Bacteria. Toxic. Chemical. Traumatic.
	(b) Specific	{ Gonococcal. Chancroidal. Syphilitic.

The ETIOLOGIC FACTORS may be summarized as follows:

- | | | |
|------------------|---|---|
| Predisposing: | { | <ol style="list-style-type: none"> 1. Diathesis—gout and rheumatism. 2. Chronic urethral disease. 3. Morbid state of urine. 4. Sexual abuse. 5. Indiscretion—dietetic, sexual. 6. Alcoholism. |
| Exciting causes: | { | <ol style="list-style-type: none"> 1. Trauma. 2. Bacteria 3. Toxic. 4. Chemic. 5. Sexual excess or strain. |

SIMPLE URETHRITIS.

SYNONYMS.—Non-specific and non-infectious urethritis.

Any of the causative factors enumerated in the foregoing classification, especially gout and rheumatism may constitute the etiology of a simple urethritis.

Some pre-existent chronic urethral affection, e.g., stricture is the usual predisposing cause. This condition renders the urethra extremely susceptible to the effect of sexual or alcoholic excesses. Therefore, the previous venereal history should always be borne in mind, in considering the true origin of non-specific infections.

SPECIFIC URETHRITIS.

SYNONYMS.—Infectious urethritis, gonorrhœa, urethritis, clap, blennorrhagia, gleet.

The PERIOD OF INCUBATION varies from twenty-four hours to ten days after the date of contagion, with an average of two to five days.

ETIOLOGY.—The predisposing and exciting causes are practically the same as those enumerated for simple urethritis; but the most accepted exciting cause is the gonococcus, which is

without a doubt, the definite specific micro-organism of gonorrhœa. This microbe was discovered by Neisser in 1879, who detected it in the pus corpuscles, by various processes of staining.

There are certain predisposing factors, however, which may render the urethral mucous membrane especially liable to gonococcic invasion. These are: a large meatus, (natural or acquired) or a condition of hypospadias. The size of the glans penis may also render its bearer particularly susceptible to infection.

The gonococcus.—This may be clearly seen with a 1-12 inch oil immersion lens, after the spread has been stained by any of the various methods. Each half of the diplococcus resembles a coffee-bean. These are usually found in colonies of ten to twenty, or more, and lie close together with their flattened surfaces almost in apposition, leaving a narrow space between them, with their convex margins outward. (Fig. 2.)

It is said that certain diplococci normally inhabit the urethra, therefore, in making a positive diagnosis or giving medico-legal testimony, the microscopic examination must be supplemented by the aid of culture tests. The gonococcus is found in the purulent discharge of acute specific urethritis, in the threads and discharges of some cases of subacute and chronic forms of urethritis, in the gonorrhœal secretions from the vagina, uterus, conjunctiva, and rectum;



FIG. 2.—Intra-cellular (a.) and (b., c.) extra-cellular gonococci. (Casper.)

and sometimes from the infected mucous membrane of the mouth, nose and skin. In many of the complicating conditions of gonorrhœal urethritis, e. g., endocarditis pleurisy and peritonitis, gonococci have been found in the blood of such infected individuals.

The DISTINGUISHING FEATURES OF THE GONOCOCCI according to Neisser are: the tendency to arrange themselves in pairs, which are usually found in colonies, and the fact that they are either extra-cellular or intra-cellular (outside or in the pus corpuscle).

Technic for the examination of gonorrhœal discharge.

—Spreads are made on cover glasses or on slides. If cover glasses are used a drop of the pus is placed on one and this covered by a second glass, which causes the pus to spread out. The cover slips are then drawn apart, the film of the discharge, on each, is then dried in the air, and can be examined at any time.

If a slide is used, a drop of the discharge is placed on it with a small cotton swab or a match stick and smeared lightly in one direction. This latter precaution should be heeded because if rubbed upon the slide, great distortion of the cellular elements usually takes place. The smear is then dried in the air and examined in the same way as the cover slips.

For a stain, *Löffler's methylene* blue is absolutely the best. The spread is fixed by passing it several times through a flame, the dye applied for 3 to 5 minutes, washed off with water, dried and mounted in balsam.

This will suffice for any specimen supposed to contain the gonococcus. If, however, any doubt exists as to the bacteria being gonococci, or, if for the purpose of deciding a medico-legal question, the preparation should be decolorized by Gram's method and counterstained with a weak solution (1-10) fuchsin

or Bismarck brown. In this staining process the gonococcus will be stained red.

TECHNIC OF GRAM'S METHOD.—The stain used in this process is an aniline gentian violet solution made as follows: Anilin oil, one part, distilled water, twenty parts, shake well. Filter through filter paper and add to the filtrate, the saturated alcoholic solution of gentian violet, in the proportion of one part to ten of the filtrate. This solution should always be freshly made. After the spread has been stained by this in the usual manner, it should be immersed in the following solution, from one to three minutes.

Iodine.....	1 part
Potassium iodide.....	2 parts
Water.....	300 parts

Then decolorize with absolute alcohol and transfer to a solution of:

Bismarck brown.....	1 part
Water.....	20 parts

Stain for $\frac{1}{2}$ minute, dry and mount in balsam and examine with oil immersion lens.

Pus cells will be found light brown in color, and the gonococci will be shown in marked contrast, imbedded in the cells. In discharges from subacute and chronic urethral diseases, a new method of staining has been suggested by Von Wahl. The mixture consists of aurine saturated alcoholic solution 15 c.c. (1-10) and from 8 to 10 c.c. of a saturated alcoholic solution of thiolin (1-20), which is shaken and 30 c.c. of distilled water then added. 1-50 of an aqueous solution of methylgreen may also be added to brighten the

cellular elements. The nuclei are thus stained a bluish green and the gonococci a deep violet color.

A great many other stains have been advocated for the staining of the gonococcus, but the processes just given should prove adequate for all purposes.

INOCULATION upon suitable culture media, should also be made to further substantiate the diagnosis. The gonococcus will not develop upon ordinary agar or bouillon.

The spreads should be examined with a 1-12 inch oil immersion lens. Quite frequently gonococci will be seen extra-cellular; but in the majority of instances, the organism is found in the pus or epithelial cells, irrespective of the origin of the discharge, whether from urethra, conjunctiva or abscess.

The culture media in which gonococci may be cultivated are, blood serum, and agar-agar, and urine and urea, and in acid solutions.

The TOXINS from gonococci may also produce an acute urethritis, but it is much less severe in its course and symptoms, than the true specific type.

ACUTE ANTERIOR URETHRITIS.

Period of incubation.—Two to ten days after exposure, as a rule, the infection becomes manifest. Sometimes, though rarely, the symptoms begin in a few hours. The average period, however, is about three days.

Etiology.—Anterior urethritis may be due to several causes, but is as a rule the result of pyogenic organisms, or their products, being absorbed at the point of an abrasion of epithelial covering on the mucous membrane of the anterior urethra.

Pathology.—When bacteria gain entrance to the urethra, the pathological changes result in a general hyperemia, swell-

ing and hypersecretion of the mucous membrane, involving principally the epithelial and subepithelial layers. In this invasion the gonococci multiply rapidly and penetrate between the epithelial cells into the protoplasm substance (observed by Bumm). When they lodge in the epithelial connective tissue layer, they are antagonized.

This reaction on the part of the tissues gives rise to an exudation, which is a favorable media for the continued multiplication of these organisms. Their further incursion is hindered at this stage, however, by the development of an epithelial covering. In the acute invasion the secretion is serous, later becoming purulent, light yellow in color and thick and creamy in character. It is at first scant, but now comes copiously. In the stage of decline the discharge becomes lighter in color, more mucoid and tenacious. In the substance of the urine which will be found quite transparent, abundant *threads*, or "*Tripper-fäden*," will be seen.

Symptoms.—A sense of itching and tingling at the meatus is first noticed. More or less urethral discharge will soon appear. At first it is thin; later it becomes mucoid, and still later muco-purulent. The patient may now complain of ardor urinæ, or a feeling of scalding on urination. Tenesmus or hesitancy in starting stream may or may not be present, in this train of symptoms. The discharge which is now thick, creamy, and copious, may even assume a greenish hue and sometimes even be tinged with blood or mucosaneous pus, as it is often termed. During this period the patient is very apt to suffer from attacks of chordee.

The next effect may be a considerable diminution in the size of the stream of urine; due to the swollen state of the mucous membrane of the urethra, thus lessening the caliber of the canal, and often causing a complete retention of urine. The

urine is frequently discharged in two or more streams, or is forked, in consequence of the irregular and contracted state of the urethra, and when it is voided it is usually attended with much straining, pain, and scalding.

In a first gonorrhœa the glands of the groin are often sympathetically affected, and become more or less enlarged and swollen, tender and often painful.

These conditions are sometimes attended with CONSTITUTIONAL DISTURBANCES, e. g., fever, restlessness, and mental anxiety. The pain often extends up along the cord into the groins, radiating down the thighs and perineum. The testicles may be tender. After the first ten days under proper care and attention, the inflammatory symptoms will usually subside and the discharge will diminish, and be much thinner and watery in its consistency. This ceases altogether in the course of the next few weeks and there is a gradual return to normality, as regards the character of the urine, etc.

The mucoid discharges from the urethra may persist indefinitely in neglected cases. This condition is commonly known as gleet. (See chap. chronic urethritis.)

TREATMENT OF ACUTE ANTERIOR URETHRITIS.

PROPHYLACTIC, LOCAL and CONSTITUTIONAL measures are to be observed in the treatment of urethritis.

The ABORTIVE TREATMENT; is sometimes resorted to if the patient presents himself soon after the date of infection, while the symptoms are still in abeyance or during the period of incubation. This method, however, is always attended with great pain, therefore, the patient should be warned of same, told of the uncertainty of its results and then, if their consent is obtained, its application is in some instances warranted. The method is as follows: The patient should first pass his urine and the

anterior urethra then be irrigated with a mild antiseptic solution. An endoscope is now passed for a distance of about three inches, and an application to the mucous membrane at the end of the tube is made with an aqueous solution of nitrate of silver (15 gr. to the oz.), along its entire surface from within outward as the instrument is being withdrawn. The patient should be kept in bed and the penis covered with a dressing saturated with a solution of lead water and laudanum or an ice bag applied. This procedure is generally followed by intense pain, the discharge becomes very copious and purulent and the ardor urinæ is intense. Should success crown this effort, the secretion will within a few days become serous and from five to six days disappear entirely.

Treatment of the acute stage.—The penis should first be examined for any anatomical defects, e. g., phimosis, hypospadias, contracted meatus, any of which may complicate the treatment, and must therefore be treated accordingly. Should any of these conditions be present, such deformity must of necessity be corrected. The patient should be instructed to abstain from all forms of exercise and even to rest in bed if possible. Riding a bicycle, horse back, etc., should be prohibited. Patients who are obliged to be about should be ordered to wear a suspensory bandage. The importance of cleanliness must be impressed upon him, also the dangers of infecting the eyes, conveying it to others, etc., all of which he must be told may be avoided by simply washing the hands thoroughly and keeping the parts from coming in contact with the underclothing as little as possible. He should avoid highly seasoned foods and condiments. The use of alcohol, coffee and carbonated drinks, should be interdicted. Asparagus, tomatoes, fish and oysters should also be eschewed.

Various ingenious dressings have been devised to keep the discharge from coming in contact with the wearing apparel. A very excellent dressing for this purpose is the gonorrhœal bag with tapes attached to it, encircling the body and arranged so that the organ is free from all constrictions and carried in a perfectly natural manner. The discharge drains into a wad of absorbent cotton which is placed in the bottom of the bag. The patient is instructed to change this cotton frequently, and burn it as soon as it becomes soiled. The bowels should be kept active and near to normal as possible, the urine rendered bland by the patient drinking plenty of water and mild and alkaline diluents.

Aside from the general outlines formulated in the regular routine treatment of an acute urethritis, cases very often present themselves in which departures are necessarily made therefrom and these are treated on the expectant symptomatic plan of treatment. The additional measures that have already been suggested are applied as the exigencies or conditions require.

For the purpose of preventing hyperacidity of the urine the following prescription is used:

R	Soda bicarbonatis	℥ ss
	Tr. hyocyami.	℥ ij
	Syr. Zingiberus	℥ iij
	Aquæ q. s. ad.	℥ vj

Sig.: Tablespoonful three times a day after meals.*

If the symptoms are very acute, and attended with swelling and œdema of the glans, immersion of the penis in hot boric acid solution is an excellent measure in affording relief.

Attacks of chordee may be prevented by prescribing the following:

*See list of *formulæ* at end of volume.

R̄ Sodii bromidi	3 iv
Tr. belladonnæ	℥ xxx
Liq. potassii	3 iv
Syr. Zingiberus	f℥. iij
Aquæ q. s. ad.	f℥. vj M

Sig.: Tablespoonful three times a day and at bed time.

During the height of the acute stage it may be necessary to administer some anaphrodisiac for obvious reasons. An excellent sedative, therefor, is:

R̄ Fl. ext. ergotæ	℥ xv
Potassii bromidi.	gr. xx
Tr hyoscyami āā	℥ xxx
Syr. aurantii q. s. ad.	℥ ss

Sig.: At bed time.

In cases of RETENTION OF URINE occurring in acute gonorrhœa it may usually be relieved by the patient taking a hot sitz bath, or applying a hot water bag over the pubis, the patient going to bed and given diaphoretics. These will in most instances relax the spasm and allow the bladder to empty itself.

The SPECIFIC CONSTITUTIONAL THERAPY is limited principally to the balsamic preparations, which are probably the most reliable adjuvant that can be given in the treatment of gonorrhœa. In the beginning it is best to give them in capsule form; e.g. balsam, cubebs and copaiba 5 to 10 minims each, as these are said to be stimulating and at the same time soothing to the urethral mucosa. In the very early stage it is even better to administer sandalwood oil in doses of about ten minims, three times a day. Sandalwood oil is usually well borne by the stomach, but is more or less irritating to the kidneys as a result of its *over stimulating effect*. Therefore, it often causes consider-

able back-ache and nephralgia. It possesses the properties, however, of rendering the urine bland and non-irritating. The copaiba and cubebs on the other hand are very apt to cause gastric disturbance, but produce very little discomfort in the kidneys. Copaiba may in its untoward effect produce a general cutaneous rash. These balsamic or antiblennorrhagic remedies, as they are sometimes called, may be combined with the sandalwood oil giving it in capsule form, as follows:

R̄	Balsam Copaiba	℥ ij
	Ol. Cubebs	℥ ij
	Ol. sandalwood	℥ vj M
	Fiat capsula No. 1	

Sig.: Two capsules three times a day.*

The **local medication** in acute urethritis is probably best and most efficient in the form of **HAND INJECTIONS**. These consist in stimulating *antiseptic* solutions, which are not only destructive to gonococci and other pyogenic organisms but nonirritating to the mucous membrane of the urethra. The *astringents*, used for the purpose of restoring as much as possible the normal integrity of the urethra, are reserved for the later or terminal stage of the disease. Just when to begin the use of these injections has been the subject of much mooted discussion. Some cases even during the increasing stage are materially benefited, whereas, in others it may be productive of harm. If however, the injections are to be used in the early stages, the ingredients should be sufficiently bactericidal, without irritation to the protective epithelium. Innumerable combinations have been suggested but only those that have been found particularly effective in the hands of the

* See list of formulæ at end of volume

author will be given consideration in this chapter. (For additional formulæ see end of this volume.)

In the early stages where an antiseptic injection is required the following is very useful:

R̄ Iodine (crystals)

Kalii Iodidi āā grs. xv

Acidi carbolici. gtts. xij

Argyrol grs. LXXV

Aquæ dist. q. s. ad. f℥. iij M

Sig.: Inject syringeful night and morning, after urinating, and retain for three minutes.



FIG. 3.—
Urethral hand
syringe.

When the condition becomes *subacute*, or arrives at the *stage of decline* and no complications have developed, it is then, that more astringent injections into the anterior urethra are particularly indicated. These are not only convenient but most beneficial at this time. It is important that the proper kind of syringe be selected. It may be made of rubber or glass with rubber tip, in which event the nozzle should be blunt and the capacity of the syringe not over four drachms. (Fig. 3.) The patients will readily acquire the skill of using these injections when once properly instructed. Among the most effective agents may be mentioned nitrate of silver 1-10,000 and gradually increasing the strength up to 1-1000. Various modifications, e. g., protargol 1-1000 to

1-100; argyrol 5 to 25 per cent. are also recommended measures. Zinc sulphate, acetate, sulpho-carbolate, 1-1000 to 100, zinc or potassium permanganate 1-5000 to 2000, muriate of hydrastin 1-500 to 100 are

likewise excellent agents in many cases where the silver salts are inefficient. Silver nitrate has the virtue of promptly destroying gonococci, but it unfortunately coagulates the albumin in the tissues, and besides is irritating. This coagulum prevents its action upon the deeper tissues, where the organism really abides. The newer salts

e. g., argyrol, protargol, etc., possess the antiseptic properties without any outward effect upon the tissues, and hence the penetrating effect is not prohibited.

IRRIGATIONS.—Another method of local treatment which is efficient when skillfully used, consists in irrigation of the urethra by means of hydrostatic pressure, with large quantities of warm solutions, e. g., of potassium permanganate, etc. The entire canal may be thus cleansed. A sufficient pressure can be exerted to overcome the action of the compressor urethra muscles. Valentine's irrigating apparatus (Fig. 4) may be used for this purpose or this can be improvised by using a fountain syringe, with a blunt end rubber or preferably glass nozzle. The patient's wearing apparel should be protected with a towel or rubber apron and the patient seated on the edge of a chair holding a basin to catch the escaping return fluid. When only the anterior urethra is to be irrigated the vessel containing the solution

should be about two feet above the level of the penis. The irrigating fluid should be as warm as the patient can comfortably



FIG. 4.—Valentine irrigator.

tolerate. The tip of the nozzle must not enter the urethra. The gland is previously washed and grasped on either side by the thumb and index finger of one hand so as to know whether or not the urethra is being over extended. JANET'S METHOD of treatment is as follows: Irrigate the first four or five days with 1-5000 potassium permanganate. On the third day include the posterior urethra. For the next ten days irrigate the entire tract daily, gradually increasing the strength of the solution until a proportion of 1-1000 or even 1-500 is reached on about the tenth day. After this time it is gradually diminished in strength.

The application of this method is not always practical, because it is both difficult and expensive on the part of the physician as well as the patient.

Various solutions have been assigned for this purpose. These are: nitrate of silver 1-1000, potassium permanganate 1-5000, zinc sulphate 1-5000, protargol 1-500, argyrol 1-100, bichloride of mercury 1-10,000.

PROGNOSIS.—In an ordinary uncomplicated case of urethritis, the disease will run a definite course towards recovery. Before a case may be pronounced cured there must be a complete cessation of discharge and absence of all subjective and objective symptoms. The urine must be perfectly clear. If a microscopic examination for gonococci is negative, the treatment should be discontinued. If after the lapse of a week or ten days without treatment and still no recurrence of symptoms he may be placed on what is called the *provocative test*. This consists simply in ordering the patient to drink several glasses of beer and present himself the following day. Its effect is carefully noted. If there is then absolutely no trace or symptoms of the infection in the urine the patient *may be considered cured*.

Ricord's axiom "*Everybody knows when gonorrhœa begins, but God only knows when it will end,*" should not be forgotten in promising the patient a cure within a definite period of time. Should the urethral mucosa be damaged during the infection, the urethra seldom if ever regains its perfectly normal condition.

EXAMINATION OF THE URINE IN URETHRITIS.

During the course of treatment of acute anterior urethritis, examination of the urine is extremely important, as it is the guide to progress of the infection and to the results of treatment. If the urine is examined in the prodromal stage, or period of incubation, its substance will be found quite clear and transparent, containing but few flakes or tiny filaments. Within the next 24 hours, however, there is added some pus and mucus which clouds the urine. This opacity usually persists throughout the florid and increasing stages. If the urine when in this state is allowed to stand for a few hours there will be noted at the bottom of the vessel a thick layer of yellowish-white deposit. There may also be seen an admixture of blood in cases where there has been some hemorrhage. The blood and pus will form a lower layer and on top of this will be a cloud of mucus. In the stage of decline, these elements are gradually diminished in quantity, and the urine becomes more transparent, in which will be seen floating flakes of epithelial cells and mucus. Gonorrhœal threads or "*tripper-jäden*" may consist of either pus or mucus, and pus, mucus and epithelial cells combined, or sometimes simply the epithelial cells held together by mucin.

The character of the *thread* is very significant, as for instance, when they contain pus, mucus and epithelium, they can be recognized macroscopically by their sinking immedi-

ately to the bottom of the vessel. This is usually indicative of a chronic exudative condition. The mucoid filaments float about and sink very slowly. They vary in length and thickness, and always contain few or more of the pus cells. These are found with the abatement of the acute symptoms. Sometimes the filaments of the urethral exudate are found in lumps agglutinated by the mucus, and if examined microscopically are found to contain mucoid epithelium indicative of some ulcerative process in the anterior urethra. This is an indication for the use of the endoscope as a means of definitely localizing the affected area.

The two glass test.—This has come into vogue at the suggestion of Thompson and is universally regarded as a most useful procedure as a criterion to the progress of the disease. The method simply consists in voiding the urine into two conical-shaped glasses. If the infection is in the anterior urethra only, the first glass will be opaque and the second clear. On the other hand if the posterior urethra is involved and the secretion is copious both glasses will be cloudy and opaque. The reasons for this are obvious. The uncontaminated urine washes the anterior urethra as it is being passed and therefore contains the debris. The remaining urine therefore seen in the second glass comes through the clean canal and consequently is clear. When the posterior urethra is also the seat of the morbid process, some of the infectious secretion is almost sure to contaminate the urine contained in the bladder, hence the second and even the third glass will show cloudy urine which has a tendency to persist owing to its deep-seated infection and therefore very apt to become chronic.

Relapses or exacerbations of symptoms very frequently occur in the declining stage of urethritis and are in a high

percentage of cases due to some indiscretion mainly in the form of alcoholic or sexual indulgences.

This exacerbation or *autoinfection* is usually the result of an apparently cured gonorrhœa. The gonococci may be lodged in the follicles of the urethra or in the seminal vesicle and prostate, which are expressed into the urethra after some indiscretion. This soon causes a profuse purulent discharge which subsides again within a few days.

COMPLICATIONS OF ANTERIOR URETHRITIS.

These may be summarized as follows:—

Chordee.	Phimosis.
Hemorrhage.	Paraphimosis.
Folliculitis.	Balanitis and Posthitis.
Periurethral Phlegmon.	Vegetations.
Retention of urine.	Cowperitis.
Rheumatism.	Cavernitis.
Gonorrhœal Conjunctivitis.	Lymphangitis.
Bubo.	Penitis.

Gonorrhœal ophthalmia.—This is fortunately seldom met with except in infants whose eyes have been infected in the mother's vagina from gonorrhœal pus during delivery. When seen in adults, carelessness on the part of the patient from soiling his fingers with the gonorrhœal pus and transferring it by this means, to his or her own eye, is the usual cause. Gonorrhœal ophthalmia is always a most virulent condition and is more common among men than in women. It may be limited to one eye or may later involve both.

SYMPTOMS.—First manifestation of the eye being involved may appear as soon as 24 hours after the infection. The earliest symptoms noticed will be congestion of the conjunc-

tiva and sclera, itching of the lids, soon followed by lacrymation, photophobia, sticking of the lids and the collection of inspissated mucus in the eyelashes. These symptoms all become intensified and the discharge becomes profuse and purulent. Edema pervades the entire organ and the patient complains particularly of great burning and pain in the eyeball, radiating up over the forehead and temple. Constitutional disturbances; those of depression, irritability and nervousness and slight febrile excitement accompany these symptoms.

PROGNOSIS.—It is always unfavorable. When both the eyes are involved it is still more grave. Ulceration of the cornea always adds to the gravity of the condition.

If the treatment is begun early and vigorously persisted in there may be some hope of checking its ravages. The seriousness of gonorrhoeal ophthalmia may be appreciated from the fact that cases have been reported from which the entire eye has been destroyed in less than 24 hours. Should the disease be controlled and ulceration of the cornea occur, the vision is always more or less impaired as a result of the opacity. The age of the person is also a factor in the prognosis.

DIAGNOSIS depends largely on the findings of the microscope.

TREATMENT.—This must be vigorously instituted and persisted in day and night. Trained nurses should be employed for this purpose. Persons with experience in this class of cases should be always given the preference. It is best where the means do not permit the employment of nurses, to send the patient immediately to a hospital where there are facilities for treating these conditions. Thorough asepsis and the most careful prophylaxis must be insisted upon. If only one eye is affected the other should be protected by a shield. The attending persons should be instructed as to their duties.

The patient should be isolated. The constant applica-

tion of cold compresses is absolutely necessary. These should consist of small thin pieces of gauze or linen, which have been thoroughly chilled upon a piece of ice. In this manner the compresses should be changed every few minutes and burned after once used. When the condition has progressed to the inflammatory stage the conjunctiva sac should be flushed copiously with bone acid solution as often as the pus accumulates, after one of these irrigations a few drops of 2 per cent. solution of silver nitrate should be dropped into the eye once daily. Argyrol 25 per cent. may also be used for this purpose. This should be persisted until signs of improvement are noted, then gradually less frequent and then finally some mild astringent, e. g., zinc sulphate solution.

This local treatment may be subordinated with constitutional tonics, light diet and the bowels kept regular.

Periurethral infection occurs not infrequently where there is a rupture of an infected follicle, and sometimes this happens behind the seat of a stricture.

Inflammation of the preputial follicles sometimes originate in the course of acute gonorrhœa and are seen between the two layers of the prepuce in the form of a small nodule, about the size of a pea, which occur singly but may sometimes be present in pairs. See Fig. 5.

Retention of urine.—As a complication of anterior urethritis depending somewhat on the extent of the inflammatory swelling of the mucous membrane, there may be a diminution of the caliber of the canal with deep muscular spasm, causing retention of urine.

A temporary congested condition often directly due to sexual or alcoholic excesses, may give rise to similar symptoms. (See chapter Retention in stricture, etc.)

Cowperitis.—Involvement of Cowper's glands is usually

unilateral but may involve both glands. These lie on either side of the urethra in the corpus spongiosum between the layers of the triangular ligament with their ducts emptying into the bulbous portion of the anterior urethra. The early symptoms are inflammatory, but the condition in a large percentage of cases soon undergoes suppuration. The symptoms are: pain, usually pulsating, swelling, and a feeling of heaviness in the



FIG. 5.—Abscess of the preputial follicle.

perineum, which later becomes more swollen, discolored, and œdematous. The œdema may extend up into the scrotum. Cowperitis is very frequently attended with more or less constitutional disturbance. (See p. 79, Abscess of Cowper's glands.)

Gonorrhœal rheumatism or gonorrhœal arthritis which is a still better term, is an inflammation principally of the *joints, fasciæ, bursæ, and tendinous sheaths*, occurring as a complication of urethritis. It is much more frequently seen in men than in women. This inflammatory condition of the joint is primarily caused by the gonococcus and its toxins.

It has no definite period of outset. The BURSÆ which are usually attacked, are those in front of the tendon Achilles and the one beneath the os calcis. The TENDINOUS SHEATHS may also become involved alone or secondarily to joint lesions. These sheaths are usually the extensors of the fingers, and the dorsal flexors of the toes. The SYNOVIAL MEMBRANE may also be the seat of gonorrhœal infections. This form of arthritis is usually *monarticular*.

THE SYMPTOMS in the prodromal period which may be more or less severe, are: pain in the affected joint, slight chill, general myalgia, malaise, and mild fever. The effusion into the part is either serous, sero-fibrinous, seropurulent or purulent in character. The knee joint is the one most frequently attacked. The joint is much enlarged, and tender, and the overlying skin red and tense. Pain may be dull and continuous or pulsating and sharp, and is usually attended with nocturnal exacerbations. The mobility of the part is impaired. This process continues ordinarily in most favorable cases from five to eight weeks but may persist for months. When the effusion is purulent, its duration is indefinite. Sometimes gonorrhœal arthritis may be insidious in its onset and develop into a chronic condition. The affection then is attended with relatively little pain. The joint is swollen and may result in permanent deformity. Where the involvement is polyarticular, the course is frequently less severe. It generally attacks the large joints.

The important lesion of gonorrhœal rheumatism is SYNOVITIS which is either serous, sero-fibrinous, or sero-purulent.

The COURSE of gonorrhœal arthritis depends largely on the nature of the effusion. The best prognosis may be given and the quickest results obtained where the lesion is simply a serous exudate. In chronic affections of the joints, ankylosis

may result, and the process may go so far as to attack the muscles, tendinous sheaths and bursæ.

COMPLICATIONS.—These are most commonly, *arthritis*, *bursitis*, and *inflammation* of the *tendinous sheaths*.

DIAGNOSIS.—A history of gonorrhœa either just prior or a co-existing urethritis, will in the majority of cases establish the nature of the affection. The absence of sweating and the tendency to attack the larger joints are also characteristic of specific arthritis. Examination of the urine should materially aid the diagnosis. The following table is convenient in making a

DIFFERENTIAL DIAGNOSIS OF

Gonorrhœal Rheumatism. Simple Rheumatism.

(By Fournier, and modified by the author.)

Usually monarticular, less commonly polyarticular. In the latter instance the joints are affected consecutively.

Fever and constitutional disturbances, mild. Symptoms when acute are mild in their duration.

Caused by gonorrhœal infection.

Rare in women.

Secondary hydrarthrosis common.

No sweating.

Urine not modified.

Cardiac complications rare.

Synovitis of tendons, sheaths, bursæ, etc.

Tendency to recurrence with succeeding gonorrhœal infections.

Most frequently polyarticular involving several joints simultaneously.

Systemic phenomena, severe and persistent.

Caused by rheumatic diathesis and cold chiefly.

Common in male and female.

Secondary hydrarthrosis rare.

Abundant sweat, acid in character.

Urine specially modified.

Cardiac complications frequent.

Sheaths and bursæ not involved in the inflammatory process.

Recurrences are not dependent on exacerbation of urethritis.

PROGNOSIS.—Depends on the extent of the involvement and the vitality of the patient. Usually from one to three months is the duration.

Treatment.—It is of the greatest importance, first to remove the infecting source of the joint lesion, the seat of which is in the urethra, hence, measures must be immediately taken to eradicate the infective foci. This consists in *instillations into the deep urethra* of about two drachms of $\frac{1}{2}$ to 1 per cent. nitrate of silver solution, by means of a catheter or Keyes-Ultzman syringe.

THE LOCAL TREATMENT of the joint requires rest in bed and such measures as applications of lead water and laudanum, if there be much redness and swelling. Internally, opiates may be given for the relief of the pain. Oil of wintergreen, salicylates, sodium and potassium iodide, tr. ferri chloride, syr. ferri iodide, are also recommended as antirheumatic agents.

When the acute symptoms subside Taylor recommends blistering with cantharidal collodion or a fly blister, the blister kept open with tartar emetic ointment.

Aspiration and irrigations of the affected joint, where there is extensive hydrarthrosis is also advised. In mild cases, mercurial ointment combined with ichthyol or Ung. Belladonnæ may be used often with considerable benefit.

Should the condition become chronic, dry heat, massage, etc., can be resorted to, and is frequently attended with good results.

Bubo.—Gonorrhœal bubo is sometimes seen where the lymphatic glands of the groins become enlarged. They are in most instances seen to be inflammatory, and but rarely undergo suppuration unless where there is a tuberculous diathesis or cachexia.

TREATMENT.—The principles of the local treatment are practically the same as for chancroidal bubo (q. v.).

Balanitis is an inflammation of the mucous membrane of the glans penis while in **Posthitis** the inflammatory process is confined to the mucous membrane of the prepuce. When both glands and prepuce are involved it is termed **Balano-posthitis**. These conditions are simply due to the action of irritating secretions which are retained, being superinduced by a tight or exuberant prepuce. The surfaces of these mucous membranes will be found red, painful slightly ulcerated, and purulent sometimes resembling chancroid.*

Vegetations.—Warty excrescences which appear upon the mucous membrane of the glands and prepuce are also the result of irritation. They consist of piled up proliferating epithelium forming the covering of highly vascular growths. These often attain an enormous size and extend over considerable area.*

Lymphangitis.—This complication involves the lymphatic vessels of the penis. It is attended with swelling and oedema of the part. It is usually red, and is attended with relatively little pain.*

ACUTE POSTERIOR URETHRITIS.

Infection of the deep urethra not regarded as a complication of anterior urethritis but rather as a sequence of the gonococcic invasion of the anterior urethra. Some authorities claim that in 80 to 90 per cent. of the cases of anterior urethritis there is more or less posterior involvement. This is simply due to the extension of the inflammatory process by continuity from the penile to the deep urethra. Posterior urethritis may occur independently of anterior urethritis from such causes, as injury by instrumentation, calculi, hyperacidity of urine, and from instillation into the deep urethra.

SYMPTOMS.—There is no definite chronology of symptoms.

*See Chapter on Affections of the Penis.

The sense of burning in the deep urethra and perineum, especially after micturition, and a feeling of heaviness in the testes are characteristic. There is usually a sudden *cessation of discharge* from the meatus and an increased desire to urinate. The *two glass test* will show an *opacity* of the urine and the possibility of confounding this cloudiness with that of phosphaturia must be kept in mind and hence excluded by the acetic acid test.* The burning pain felt in the deep urethra, is aggravated at the end of urination, giving rise to a sense of heaviness in the perineum, often associated with spasm, which may occasion a slight terminal hematuria. The *increased frequency of urination* may be both diurnal and nocturnal, but is usually more pronounced during the day, when the patient is up and about. *Pain* in the glans penis felt at the end of urination may also be present. Following in this train of symptoms may be partial or complete *retention* and relative *incontinence of urine*. Retention, in initial infections is often spasmodic, but in cases with a previous venereal history it may be due to stricture, prostatitis, hypertrophy or abscess of the prostate. Digital rectal examination of the prostate will find this organ more or less tender, painful to pressure, but not enlarged. *Albuminuria* is another symptom which frequently accompanies a severe posterior infection. Irritability of the sexual centers as a symptom of posterior urethritis is often present, giving rise to *chordee*, *priapism*, etc. The acute symptoms usually last but a few days.

DIAGNOSIS.—There being no discharge visible at the meatus, the patient experiences very little or no discomfort, therefore in the average case the patient is ignorant of any deep involvement. It is not until an exacerbation from some cause occurs that he realizes the true state of affairs. ~~At the~~

* See Chapter on Examination of the Urine.

urine is examined by the two glass test, both urines will be opaque and will be found to contain an abundance of various sized threads, more especially in the second glass. The latter urine may contain the prostatic filaments, as the result of muscular contraction. Where there is an exacerbation of a chronic posterior urethritis, the symptoms are more pronounced. The patient complains particularly of an increased frequency of urination, which may be accompanied with more or less pain and discomfort at its termination. This pain may be sharp or dull and heavy, radiating into the rectum, scrotum and groins. In other cases where the condition assumes a chronic form the symptoms do not become manifest perhaps until there has been some alcoholic or sexual indulgences. The patient's general mental and physical vigor in most cases sooner or later becomes impaired, and in many instances they become sexual hypochondriacs.

PATHOLOGY.—Gonorrhœal infections in the posterior urethra generally produce a catarrhal and exudative condition, involving the superficial and submucoid structures, which may result in thickening or in *granular* and *congested* areas or *erosions*, as a consequence of epithelial proliferation and desquamation. The patches may be distinctly seen by the endoscope.

The COMPLICATIONS of Posterior Urethritis are:

Orchitis.	Seminal Vesiculitis.
Epididymitis.	Ascending Infection.
Cystitis.	Peritonitis.
Prostatitis.	Endocarditis.
Deferentitis.	Rheumatism.
Spinal Meningitis.—(Extremely rare.)	

DURATION is always uncertain and the condition may last *many weeks or months*, depending largely upon the treatment

and the co-operation of the patient. The declining stage is marked by the general amelioration of symptoms and the gradual improvement is shown in the two glass test.

PROGNOSIS.—In the average case a cure may be effected in from one to two months. It is impossible to foretell complications, but the progress to recovery is usually favorable.

Treatment.—Rest as much as possible should be advised. The urine must be kept bland and non-irritating by the ingestion of plenty of water, milk or butter-milk. All hand injections must be immediately discontinued. Urotropin in doses from 5 to 8 grains renders the urine antiseptic; prevents decomposition, and also irritation by keeping it neutral. If there be much tenesmus or pain, an opium ($\frac{1}{2}$ gr.) suppository in the rectum will give relief. Sodium bromide, sandalwood oil, etc., may also be given pro re nata. Local treatment is likewise essential. After the acute symptoms have abated, instillations by means of a Keyes-Ultzmann syringe (Fig. 6.) or soft rubber catheter, into the posterior urethra and



FIG. 6. Keyes-Ultzmann syringe.

bladder should be given. Silver nitrate solution 2- $\frac{1}{2}$ grs. to the ounce, argyrol 10 to 20 per cent. and protargol, $\frac{1}{2}$ to 2 per cent. may be employed for this purpose.

Gonorrhœal cystitis may be acute or chronic. An inflammation involving the whole mucous membrane of the bladder is fortunately a very rare occurrence as the condition is more often confined to a few inches of the sides of trigone of the bladder, which is termed **urethro-cystitis**. This condition

may be observed by means of the cystoscope. (See chap. on Cystoscopy.) When the bladder is involved, the principal symptoms are pain over the symphysis pubis, malaise, and fever. The urine is turbid in both glasses and contains spindle shaped epithelium, pus and bacteria. In the early stages it is acid, but later becomes alkaline and ammoniacal. This condition may run its course in from 1 to 2 months or may become subacute or chronic. Sometimes the pain is greatly aggravated at the end of urination. Micturition may be frequent both night and day. Usually this affection remains *superficial*; in other cases it involves the submucoid tissues, which form is called "*parenchymatous*" cystitis. This may go on, resulting in ulceration and is often the forerunner of ascending infection.

Diagnosis.—The diagnosis of gonorrhœal cystitis is based upon the history of the original infection and the examination of the urine. The urine test should be made conclusive by testing for urates, phosphates and by the microscope. These elements may be readily tested (see chap. on Exam. of urine). Gonorrhœal cystitis occurs more commonly in the young and middle aged.

Treatment.—Effort should be directed towards keeping the urine bland and unirritating. Highly seasoned foods condiments, and alcoholics, are to be interdicted. The patient should rest as much as possible. Urotropin or dilute nitro-muriatic acid are useful in neutralizing the alkalinity. Soda salicylate, or sodium benzoate may also be given for their aseptic effects upon urine. Eucalyptus; boric; salol; celestin vichy, are also additional measures often productive of much good.*

The bowels should be kept active by laxatives if necessary.

The local treatment consists of warm irrigations of

*See list of formulæ at end of volume.

saturated boric acid; normal salt; nitrate of silver (1:8000); and potassium permanganate (1:5000) solutions.

CHRONIC URETHRITIS.

SYNONYMS.—Gleet, chronic gonorrhœa.

Etiology.—There are innumerable causes which may directly or indirectly occasion chronicity of urethral infections of gonorrhœal origin. Chronic urethritis is often attributed to improper treatment, but frequently the patients themselves are to blame, more especially in cases where a history of improper sexual hygiene or alcoholic indiscretions is given. Very often gouty, strumous, or cachectic diatheses of the individual enter into the etiology and therefore must be taken into consideration, either as a direct or predisposing element. Syphilis, too, will sometimes induce chronic urethritis.

Among the LOCAL CAUSES which are chiefly responsible for the persistence of the symptoms are *congested* or *granular patches* and *stricture*, but among the many other conditions which may be enumerated are: *folliculitis*, *cowperitis*, *œdematous folds*, *superficial erosions*, *ne-crotic patches*, *seminal vesiculitis*, *papillomatous growths* in the urethra, *juxta-urethral sinus*, *infection* of the *sinus pocularis*, *hypertrophy* of the *prostate*, *prostatitis*, *peri-urethral abscess*, *mucous patches* in the urethra and *genito-urinary tuberculosis*.

The **symptoms** of chronic anterior urethritis are principally: the so-called *morning drop*, and glueing together of the meatus. Examination of the urine by the two glass test will show either one or both glasses to contain threads.

When the bulbous or deep urethra is the seat of a chronic urethral infection there may or may not be any discharge visible from the urethra, but the patient will usually give a history of a

discharge occurring some time or other during the day with no further symptoms. A very common condition encountered under such circumstances is an involvement of the GLANDS OF LITTRE and crypts of Morgagni which is sometimes termed *folliculitis* or still better **chronic follicular urethritis**. A thorough exploration of the parts is imperative in order to arrive at an intelligent understanding of the true source of a chronic urethral discharge. The condition of the mucous membrane of the urethra should also be determined by means of the endoscope.

The symptoms of chronic urethritis are not definite, as each case is practically a law unto itself, and depends largely upon its cause and the extent of the infectious processes.

Diagnosis.—When the symptoms persist for a period beyond the subacute stage, which may be said to last four months, the condition assumes the so-called chronic form. A patient presenting himself with an infection of long duration, must be thoroughly questioned as to the history of his ailment and then carefully examined. His habits should be ascertained and any previous venereal history noted. He should be instructed to pass his urine into two conical glasses; if the first urine is turbid and the second clear, it can be deduced that the infection is limited to the anterior urethra, and vice versa, if the second glass is turbid then the posterior urethra is the seat of the infection. The next step should be a rectal examination of the prostate gland and the seminal vesicles to ascertain their condition. If the urethral symptoms are not acute, an examination of the urethra with the bougie (about 26 French) should be made, noting the resistance of its passage. Examine the urethra along its entire length to determine any thickening or follicular involvement, also the *condition of the Cowper's glands*. Supplementing these

measures—the Endoscope is invaluable in localizing definitely any morbid areas and the treatment is directed accordingly. (See chapter on Endoscopy.) It must be remembered that strictures are a prolific cause of chronic urethritis in 50 per cent. of the cases.

Treatment.—When the infection is confined to the anterior urethra, the tract should be irrigated with warm potassium permanganate solution 1-3000, or nitrate of silver solutions 1-15,000 to 1-10,000 every two or three days. If the condition is a follicular urethritis, this should be followed by the passing of a bougie lubricated with Finger's or Unna's ointment (see formulæ at the end of volume) into the urethra and the follicles vigorously massaged by pressure with the fingers from without to get rid of the inflammatory exudate, and promote resolution. Should the entire length of the urethra be infected, the procedure must be supplemented by instillation with a Keyes-Ultzman's or Guyon syringe (Fig. 7) or soft



FIG. 7.—Guyon syringe.

rubber catheter, of *nitrate of silver* (1 to 2½ grs. to the oz.) or its various modifications in different strengths injecting from 2 to 4 drachms at each treatment. Instillations into the deep urethra every third day will usually suffice, but in severe cases may be resorted to daily until improvement follows.

When argyrol is used for this purpose it should be in solution from 5 to 20 per cent.; protargol ½ to 2 per cent. Copper sulphate ½ to 1 per cent. may also be employed. Should any circumscribed morbid areas or infiltrations be definitely localized by the urethroscope, they may be touched directly with any

of these agents by means of this instrument. The best method of promoting absorption of infiltrated tissues is by pressure, through the use of sounds—(preferably Beneque's double curved bougie or Kollman dilator (Fig. 8)—supplemented by massage from without over the curve of the instrument. Should the flakes or the threads in the urine upon microscopic examination be found to contain no bacteria, but simply consisting of desquamated epithelium and mucin from the anterior and bulbous portion of the urethra, Finger's ointment will be found very efficient if applied to the mucous membrane over its entire surface by means of a long wire applicator tipped with a cotton swab. When posterior urethritis is associated with chronic prostatitis and seminal vesiculitis, the subjective symptoms are often temporarily those of atonic impotence. In such instances deep instillation of silver solutions and massage of the prostate and vesicles, via the rectum every third day and the passage of a cold steel bougie will usually be followed by improvement within a comparatively short time.



FIG. 8.—Kollman dilator.

The endoscope.—Its diagnostic and therapeutic uses make this an invaluable instrument in the treatment of chronic urethritis. The morbid changes may be viewed without discomfort or harm to the patient, and the infected follicles,

be distinctly seen in deep red, pus exuding spots. The color of the mucous membrane, often congested and purplish; granular patches and the thickened appearance of the mucous membrane; hyperemia; and sometimes papillomata, erosions and ulcerations, may be observed. Besides localizing the inflammatory focus the endoscope permits the application of remedies to these lesions. Probably the best endoscopes which we have at the present day are the Otis, and Swinburne instruments.

The Infectiousness of Chronic Urethral Discharges.

At just what stage the gonococci disappear from the discharge is always most indefinite, hence the importance of conservatism in giving an opinion as to the safety of the individual entering into matrimony within any certain prescribed time after the date of infection. Pus containing gonococci has been found many months after having been presumably cured. Before any decision is reached therefore, even in dismissing a patient as being permanently free from the disease, the physician should carefully examine the first morning urine. Should pus and epithelial cells be present, and even if microscopic examination be negative, the treatment must be continued. Where the threads persist it is important to make repeated examinations of the secretions from the seminal vesicles and prostate. It is safe to say from the conclusions of most authorities that after an interval of freedom from all symptoms for about six months from the time of the disappearance of the infection, the patient may be considered safe to marry.

COMPLICATIONS OF POSTERIOR URETHRITIS.

Epididymitis.—As a complication of posterior urethritis the epididymis very frequently becomes the seat of an acute

inflammation. The diseased process may be confined to the epididymis or may involve by ascending infection, the testicle and vas deferens. An acute epididymitis is always attended with an effusion of lymph into the cavity of the tunica vaginalis. Involvement of the epididymis generally occurs during the increasing or declining periods of an acute urethritis. Epididymitis may be lateral or bilateral, the latter taking place secondary to the invasion of the one epididymis.

ETIOLOGY.—The causes may be *predisposing* and *exciting*. The chief predisposing cause is gonorrhœa. The exciting causes are: trauma, e.g. from urethral instruments and irritating injections. Violent exercise or muscular strain; seminal emissions or alcoholic and sexual indulgence. Transportation of the infective process to the epididymis is caused by the retro peristaltic movement of the vas deferens.

SYMPTOMS.—Previous to any definite symptoms of the inflammatory process extending to the epididymis, the discharge at the meatus ceases. This sudden cessation of the secretion is therefore always significant. The patient first experiences more or less discomfort in the scrotum and groins, which soon becomes aggravated and severe. Accompanying the pain he may or may not have constitutional disturbances; e. g. chills, fever, lassitude, loss of appetite, constipation and a frequency of micturition. None of these symptoms is pathognomonic but simply points to a general reaction. Physical examination of the epididymis will find it to be swollen and painful and extremely sensitive to touch. The scrotal tissues overlying it are in most cases discolored and œdematous. When the *globus minor* is involved, primarily a small sized semilunar shaped or leech like tumor may be distinctly felt behind and adherent to the testicle. The growth is comparatively small, but if the body and globus major (the

head) are included, it becomes quite large, often obscuring the testicle itself. The pain is described as being dull and sickening, continuous and attended with nocturnal exacerbations. This pain is aggravated with the least movement of the body, and is in most cases so intense for a few days as to keep the patient in bed occasioning great annoyance and loss of sleep.

When the testicle becomes involved the condition is called **epididymo-orchitis**. This is a very frequent occurrence. Epididymo-orchitis is always attended with great swelling and effusion, the pain radiating into the perineum up along the cord into the groins and down the thighs. Examination of the prostate and seminal vesicles will find these organs slightly swollen and congested, being especially marked on the corresponding side of the affected testicle. This condition lasts from one to two weeks but the climax of the pain is usually reached on the fourth or fifth day. Subsequent to a gonorrhœal epididymitis or epididymo-orchitis there may be more or less induration which is either temporary or permanent. Such an area of chronic induration is fortunately not noticeable except to touch. The surface of the indurated mass is usually quite smooth, whereas in tubercular epididymitis the surface presents the characteristic nodular and uneven surface.

COMPLICATIONS OF EPIDIDYMITIS.—These are mainly occlusion of the seminiferous ducts, abscess of the testes, gangrene of the scrotum, neuralgia of the testicle (not common), and sometimes atrophy and hypertrophy, and chronic hydrocele.

DIAGNOSIS.—Epididymitis and epididymo-orchitis have been mistaken for hematocele of the tunica vaginalis and traumatic orchitis. History of a concomitant urethral infection

swelling, œdema and redness of the scrotum and the pain in the testicle will usually furnish enough data to render a diagnosis easy.

PROGNOSIS.—In most cases it is favorable where the habits of the patient are good, and the treatment is efficient. The question of sterility from the danger of occlusion of the vas deferens depends whether one or both sides are involved. When the lesion is unilateral and confined to the head of the epididymis the prognosis is always better. Examination of the semen for spermatozoa must be made from a number of specimens obtained at different times before the question of sterility can be definitely settled.

Treatment.—The cardinal factors in the treatment of epididymitis or orchitis are: rest in bed, elevation of the swollen organ and hot or cold applications.

The remaining treatment is merely symptomatic. If urethral injections have been employed they must be discontinued. If there is much pain it should be relieved by opiates or the application of leeches along the cord. Lead water and laudanum is an excellent application when kept continuously applied to the part by means of a gauze dressing, with which it is saturated. The bowels should be kept active, giving salines and cathartics if necessary. The above measures are usually all that are necessary, but other additional methods have been suggested; e. g. withdrawal of the secretion from the cavity of the tunica vaginalis by means of a small trocar or tenotome. This procedure is attended with great pain and always fraught with more or less danger and is therefore to be emphatically condemned. Ointments are in many cases efficient in promoting absorption, inducing resolution, and allaying pain. An excellent ointment is ichthyol and lanolin (25 per cent). Spread thickly on lint and cover the

entire scrotum. Another formula used in the same manner is:—

℞ Unguent hydrarg.....
 “ ichthyol.....
 “ belladonna āā..... ʒ ij.
 Petrolati q. s. ad..... ʒ j.

Strapping of the testicle is sometimes beneficial. The scrotum is first shaved and then encircled with strips of adhesive plaster about one inch wide. This soon comes loose, however, and must therefore be changed daily.

Chronic orchitis may succeed an acute attack or occurs in some cases independent of any other condition.

The exciting CAUSES are: chronic cystitis, hypertrophy of the prostate gland, stricture and gonorrhœa.

If the exciting cause is known, treatment must be directed thereto. It is best for the patient to remain in bed and be given internally potassium or sodium or sodium iodide or syr. hydriodic acid. If this does not answer, some mercurials should be ordered: e. g. calomel, blue mass or protiodide of mercury.

Congestion of the prostate.—Acute congestion may occur as one of the complications in the later stages of acute posterior urethritis.

The SYMPTOMATOLOGY is that of a severe form of posterior urethritis. The patient will complain particularly of the *pain* and the sense of fullness in the rectum, perineum, and at the neck of the bladder, sometimes throbbing in character. The rectal and vesical *tenesmus* may be very pronounced. The urinary parabulum is lost. The *swelling* of the gland may be so large as to give rise to straining and frequency of urination, also some pain on defecation. This may be accompanied by *priapism* and a slight *hematuria*. The function

of *urination* when *impaired* always adds to this distressing condition.

DIAGNOSIS.—Examination of the urine by the two glass test will reveal a condition very much the same as that of posterior urethritis. Rectal examination of the prostate will find the organ considerably swollen or painful to touch, often bulging to such an extent into the rectum as to impede the entrance of the finger.

Subacute and chronic congestion of the prostate is said to be due to mechanical irritation, e. g. calculi, passage of sounds, catheters, lithotrites, cystoscopes, etc., and also to stricture. Subacute congestion may be likewise the result of alcoholic or sexual excesses and violent exercise. The condition may be acute, subacute, and chronic. It presents symptoms resembling those of a severe form of posterior urethritis. The treatment is identical and must be vigorously persisted in.

Gonorrhœa of the rectum is fortunately very rarely seen but a patient thus affected may occasionally be found in instances in which sodomy has been practised.

The **SYMPTOMS** at first are those of a mild degree of inflammation in the rectum, rendering defecation more or less painful and soon followed by a profuse serous, sero-purulent or sero-sanguinous discharge. These manifestations are liable to become so severe and aggravated as to cause considerable suffering. Frequency of defecation is sometimes present and is usually attended with constitutional disturbances. The objective symptoms are hyperemia and œdema of the mucous membrane, and often there may be seen areas of ulceration about the anal ring. From the anal orifice exudes a copious, thick, foul smelling discharge. This affection is more frequently met with in women and young boys.

The **DIAGNOSIS** is as a rule readily made unless obscured by

a misleading history on the part of the patient. Microscopic examination of the discharge will in itself prove conclusively the nature of the affection.

PROGNOSIS.—With proper treatment and cleanliness it is always favorable.

TREATMENT.—The patient must rest as much as possible, given hot sitz baths, mild antiseptic rectal irrigations, hot or cold and the bowels kept loose. If the pain is severe, an opium or iodoform suppository will give relief. Unless the symptoms are very severe, injections of about 4 to 8 drachms nitrate of silver 1-5000 to 4000 directly into the rectum may be given daily until the condition subsides, and then every second or third day.

The mouth may also be the seat of gonorrhœal infections, but such cases are exceptionally rare and have no definite symptomatology.

GONORRHOEA IN THE FEMALE.

The gonococci may invade any part of the female genitalia. The morbid process may be confined to the urethra, the os uteri, vagina, vulva, Skene's glands, Bartholin's glands, vestibulo vaginal glands, and later by continuity involve the uterus, tubes, ovaries, and peritoneum. Gonococci most frequently attack the urethra, therefore, gonorrhœal urethritis is the most common affection met with in the female. The SYMPTOMS and PATHOLOGY are very similar to that of the male, but are ordinarily less acute and with tendency to become chronic. The period of incubation is practically the same. After the first few days, the acute stage develops, patient feeling a sense of heat and burning in the urethra aggravated by urination with increased frequency of urination. Examination of the tract will find a copious sero purulent

discharge, whitish or yellowish green in color, and if this is scant it may be readily expressed from the meatus by pressure on the floor of the urethra from within outward. The urethral orifice will be congested, sensitive and swollen. Examination of the urine by the two glass test should always be made to determine whether the bladder is involved or not.

Chronic urethritis in the female is attended with no *subjective symptoms* and is recognized only after careful examination. In making a **DIAGNOSIS**, the orifice should be cleaned previously and pressure with the finger made upon the floor of the urethra from behind forward. This must not be done until several hours after the patient last urinated. A drop of the discharge if present, containing the gonococci, will be expressed by this means. The endoscope in these cases may be used to advantage, by enabling one to recognize the follicles of the urethra which are sometimes involved. These if present will always prolong the disease. The follicles near the urethral orifice are of especial importance and must be examined carefully for the original focus of the inflammation. Chronic urethritis in women is as a rule more easily cured than in men, but is often unrecognized and therefore remains untreated. Chronic gonorrhœa in the female is one the most frequent causes of sterility and of chronic invalidism.

Chronic gonorrhœal inflammation often may remain inactive involving the same follicles of the urethra, or to a vulvo-vaginal gland, or to the cervix to which may be attributed the source of an infection acquired from coitus with a woman who presents no evidence of the disease. In these same instances he may have intercourse with this person many times before contact occurs with the gonorrhœal virus.

Vaginitis.—This condition occurs in many cases of acute

gonorrhœa. Microscopical examination of the vaginal secretion is difficult and often uncertain, owing to the fact that the vagina contains many other micro-organisms, including the diplococci, which it is difficult to differentiate from the gonococci. Culture tests should be employed in doubtful cases. The secretions from the cervix and urethra give the same results. Gonorrhœal vaginitis usually only lasts from 3 to 5 weeks, but has a great tendency to recur at the menstrual period or from alcoholic stimulants, and to persist either as diffuse chronic vaginitis or in localized patches of congested, swollen, and eroded mucous membrane.

Vulvitis.—In adults vulvitis has not yet been demonstrated to be gonorrhœal in character. The condition results from contact of the surfaces with irritating discharges from the vagina and the urethra as a result of uncleanness. This inflammation corresponds with balanitis in men. In children gonorrhœal inflammation of the vulva is more common. It is sometimes very acute and the symptoms severe, e. g. severe pain, burning and itching.

Bartholinitis.—Inflammation of the vulvo-vaginal glands is most frequently caused by gonorrhœa and when due to such infection either remains localized and undergoes involution or runs a rapid course and terminates in suppuration.

Chronic inflammation of these glands often complicates chronic gonorrhœa. The affected gland is usually found as a firm, painless nodule; its duct is dilated and reddened. Pressure on the gland usually causes the escape of a mucous or muco-purulent discharge which may contain gonococci.

Inflammation of the uterus and its appendages.—Endometritis of the uterine neck occurs commonly with acute gonorrhœa, and the tubes, ovaries, and the peritoneum may become secondarily involved. The origin of the inflammation

in these organs cannot be determined by the symptoms alone, but must be based upon other evidences of gonorrhœa and by the history. The gonococcus is a most prolific agent in the production of pelvic inflammatory conditions, which fact has been conclusively evidenced by its presence in the pus of pyosalpinx and in the epithelium and connective tissue of the fallopian tubes.

Treatment.—Thorough cleanliness which is of the utmost importance is readily accomplished by frequent douches. If the condition is acute the treatment should consist in rest, hot sitz baths, and hot or cold douches of the vagina. Hot irrigations are probably better, if they can be comfortably borne by the patient. Any of the mild antiseptics, e. g. potassium permanganate, 1-5000 to 2000, boric acid, lysol or creolin ($\frac{1}{2}$:2 per cent.) can be used for this purpose. Dietetic and hygienic treatment is the same as that for the male. The discharges, and mucous surface may be prevented from coming in contact with the underclothing by the patient wearing a piece of absorbent cotton between the folds of the labia, held in place by a vulva pad and "T" bandage. In the stage of decline when the acute symptoms subside, the douches may consist of nitrate of silver 1-1000 to 1-100 followed by a daily application of either nitrate of silver solution 30 to 40 gr. to the oz., or copper sulphate 30 to 60 gr. to the oz., directly made to the cervix and cervical canal. Tincture of iodine is also an excellent application for keeping these parts clean. Following this a tampon of non-absorbent cotton saturated with argyrol 20 per cent. should be inserted into the vagina, or of iodoform and glycerine, if the patient does not object to the odor. When the urethra is the seat of the infection a swab of cotton about two inches in length on the end of an applicator and saturated with nitrate of silver (solution 1

to 5 gr. to the oz.) may be inserted into the urethra along its entire length and left in place for 3 to 5 minutes. This is a most efficient procedure. This treatment should be preceded by the patient's bladder being emptied and the urethra irrigated. Some authorities advocate instillations into the bladder with these various antiseptics, allowing it to remain until the next urination. Involvement of Skene's glands seen at the urethral orifice or of the glands of Naboth when found must be opened and treated according to the principles of surgery.

TREATMENT OF ACUTE BARTHOLINITIS.—Absolute rest is essential, and the application of hot fomentations. If resolution does not occur and the process terminates in suppuration, the condition is one that assumes surgical importance. Further complications, e.g. endometritis, salpingitis or pyosalpinx and involvement of the ovaries must be treated according to the principles of gynecology. The constitutional treatment consists in giving oil of sandalwood, cubebs and copaiba, or these three in combination, (formulæ same as that given in the chapter on treatment of gonorrhœa in the male, q.v.).

Involvement of the vulva is often attended with considerable itching and burning which may be relieved by hot sitz baths, lead water and laudanum solutions, and later when the symptoms begin to subside the part may be touched with 1 per cent. solution nitrate of silver 5 to 20 gr. to the oz. and later copiously dusting the area with boric acid and talcum powder.

CHAPTER III.

AFFECTIONS OF THE PENIS.

PHIMOSIS.

Phimosis is a condition of abnormal narrowing of the preputial orifice in which retraction of the foreskin is either difficult or impossible. The foreskin may or may not be redundant.

VARIETIES.—*Congenital and acquired.*

The congenital form is in most cases adherent to the glans.

Acquired phimosis is usually the result of inflammatory or cicatricial contraction from co-existent lesions or urethritis.

RESULTS.—Recurrent attacks of balanitis, venereal warts and herpes progenitalis. Induces masturbation in very early life, increased susceptibility to infections and premature ejaculations. In infants, reflex nervous phenomena, e. g. convulsions, restlessness, and enuresis.

Treatment.—By CIRCUMCISION. In infants, one to four weeks old, the foreskin should be separated from its adhesions and removed by one sweep of the knife. No anæsthetic is necessary and hemorrhage and pain are slight. Circumcision in congenital phimosis of older children and adults, the technic is as follows: (See Figs. 9, 10, 11 and 12.) The field is rendered aseptic, excessive hair removed, etc., parts are cocaineized with 1 or 2 per cent. solution, or ether may be used as a general anæsthetic. The foreskin is then brought well forward with a pair of hæmostats, one above, and the other below. (*Fig. 9.*) The tissues are drawn slightly tense and the

circumcision forceps applied, lengthwise and parallel to the body of the patient. The overlying skin is then quickly

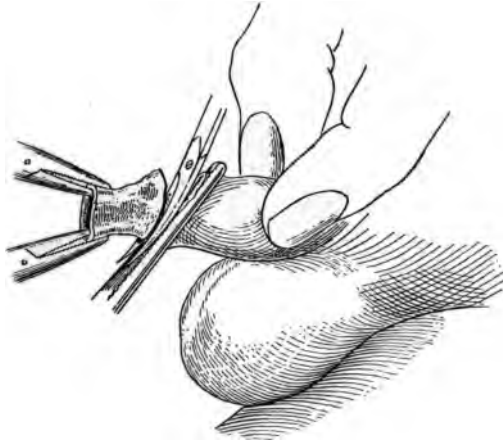


FIG. 9.—Excision of the prepuce.

severed, the clamps removed and the tissues relaxed. The next step is to divide the mucous membrane on the dorsum

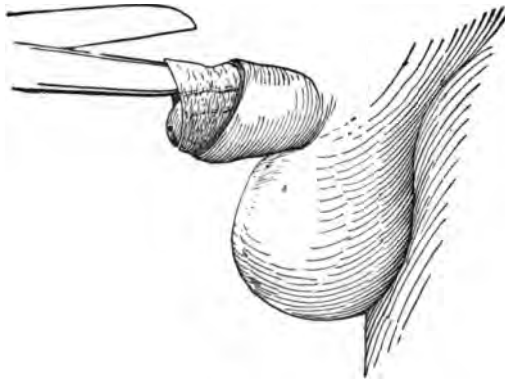


FIG. 10.—Dorsal incision of the mucous membrane. (After Veau.)
with a median incision—down to the coronary sulcus. The

two sides are then trimmed down to about $\frac{1}{4}$ inch encircling the penis. All bleeding vessels are tied. The cut margins of the skin and mucous membrane are then apposed, and held together with as many sutures (silk or catgut) as may be necessary. The subsequent dressings should consist of sterile

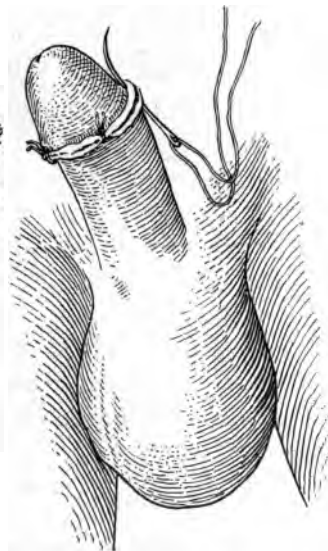
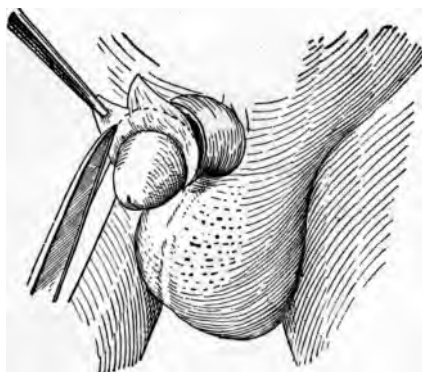


FIG. 11.—Trimming the mucous membrane.
(After Veau.)

FIG. 12.—Suturing the edges.

gauze kept continuously moist with lead water and laudanum or sublimate solution. These dressings should be frequently changed.

PARAPHIMOSIS.

Paraphimosis is an affection in which the prepuce is drawn forcibly back over the glans where it contracts and the patient is unable to effect its return, a typical case of which is shown in the accompanying illustration. (Fig. 13.)

Causes.—Pre-existence of phimosis, forcible or excessive coitus, lymphangitis, traumatism, intrapreputial lesions, e. g. chancre, vegetations, chancroids, balanitis, etc.



FIG. 13.—PARAPHIMOSIS.

Treatment.—The dangers attendant upon imprudent delay in instituting measures for the immediate relief of paraphimosis are so imminent that the importance of a proper understanding of the management of these cases cannot be emphasized too forcibly.

Whatever the causal factor may be, paraphimosis is primarily the consequence of a deformity, or the terminal con-

dition of a pre-existent phimosis. The narrowed preputial meatus for some purpose is drawn forcibly back over the glans to the corona sulcus, where it contracts, and becomes imbedded at this point. The patient then suddenly discovers his inability to cause the glans to re-enter the foreskin. The obstruction thus occasioned causes a mechanical disturbance of the circulation to the part, thereby, interfering with the venous return, and there rapidly ensues a transudation of the serum into the tissues. The penis is constantly increased in size, until by contraction, it may become tortuous and twisted.

After every effort toward reducing it meets with failure, the patient becomes alarmed, and he seeks to obtain relief, and it is this extremely painful and lamentable condition with which the surgeon is not uncommonly confronted. It is obvious, therefore, that if this stage of affairs is not radically dealt with, gangrene must quickly develop. This sequel is, fortunately, a rare occurrence, owing to the timely intervention of nature, in her effort to overcome the constriction, emancipating the glans finally, by destruction of the unyielding tissue, in the process of sloughing. Thus we have a condition which is almost invariably followed by secondary infection, in which, if there is any tendency to phagedena, it may go so far as to result in penile fistulæ. Accompanying lesions, chancroidal or specific, are always ominous for this reason. Under such conditions the treatment is somewhat accordingly modified. Clinically, paraphimosis may be classified into two types, the *reducible* and the *irreducible*.

The reducible yields to manipulation, bimanually; in the irreducible, surgical intervention is necessary.

In the first class of cases, reduction is often effected by expressing the prepuce over the corona glans. This is accom-

plished by grasping the everted preputial margin, laterally, simultaneously exerting judicious pressure and manipulation to the glans, and thus freeing from the contracting band, and slipping it back into the orifice, as shown in Figures 14 and 15.



FIG. 14.—Reduction of paraphimosis.



FIG. 15.—Reduction of paraphimosis.
(*Am. Text Book G. U. Dis.*)

Should this prove unsuccessful, attempt should be made by encircling the penis with the fingers of one hand, and making firm concentric pressure just below the unyielding ring, felt to be hard and indurated. With the other hand, taxis to the glans should be made. These methods may be facilitated by a dusting powder of equal parts, boracic acid and lycopodium, freely sprinkled over the part to enable a firmer hold. This is more commendable than the use of a lubricant. Once reduced, subsequent care should consist in the application of lead water and laudanum, for 24 to 48 hours, and constitutionally a sedative, e.g. sodium or potassium bromid.

Dorsal incision.—In cases of the second type, in which the degree of contraction is extreme the condition assumes a surgical aspect, and it is necessary to divide the constricting ring by a dorsal-incision on the median line, as illustrated in Fig. 16. No time should be lost in its performance when

other measures fail. The patient may be anæsthetized, using ethyl chlorid, nitrous oxid or ether. The part is rendered thoroughly aseptic. If there be coexistent lesions they should be carefully touched with pure carbolic acid. Cocain or eucain, 1 or 2 per cent. may under some circumstance be used subcutaneously, if the patient consents, and it is advantageous when expedition is desired. A curved pointed bistoury or straight tenotome, pair of straight scissors, and a



FIG 16.—Division of paraphimosis. (*Am. Text Book G. U. Dis.*)

few hemostats are all the instruments required. After dividing the band it is well to make sure of its completeness by easily drawing the prepuce over the glans. The whole procedure may be rendered bloodless by improvising a tourniquet with a simple twist of a catheter at the base of the penis. Subsequent bleeding may be controlled by pressure.

In specific, or even suspicious cases it is best to allow healing to take place by granulation, instead of apposing the incised edges, thus allowing better access to the part in the event of secondary infection. Under such circumstances, the dressing par excellence is iodoform, used copiously as a dusting powder or upon gauze, loosely packed between the glans and the inner tegument of the foreskin. Dry sterile gauze should

subordinate this dressing, and then by means of a T bandage, the penis should be held vertically and against the pubes, thus minimizing the blood tension and giving comfort to the patient. If possible, he should be kept in bed for a few days.

The subsequent treatment is of signal importance. The dressing should be changed every 24 hours, the desiccated blood and pus removed by a spray of hydrogen dioxod; and the penis immersed in a hot solution of potassium permanganate, 1-2000 for about five minutes. If there is any tendency to suppuration, gently apply by means of a cotton swab, 25 per cent. solution nitric acid, or acid mercuric nitrate solution, (10 per cent.) previously cocainizing the surface to be touched. Again dress with iodoform, or, if the patient objects to its odor, iodomuth, or thymiodide are invaluable substitutes. In cases complicated with verruca, the growths should be immediately removed, as these are not infrequently the primary cause of this condition. Very often cases of paraphimosis are seen in which the chief obstacle preventing reduction is simply the accompanying cedema which may be readily overcome by making multiple punctures over the cedematous folds, thus at once mitigating the degree of constriction. This in itself may be the means of effecting relief.

BALANITIS AND BALANO-POSTHITIS.

Balanitis or inflammation of the mucous membrane covering glans penis.

Posthitis is an inflammation of the mucous membrane of the prepuce. Balano-posthitis includes both conditions.

CAUSES.—Phimosis, filth, chancroids, urethritis, gout, and lithemia, bacteria, diatetes, syphilis.

SYMPTOMS.—Heat, burning and itching of the glans and prepuce, soon this is followed by the part being more or less

excoriated and ulcerated with a copious offensive cream discharge. The tissues will be tender, œdematous, and congested.

DIAGNOSIS.—Must be differentiated from urethritis, chancre and chancroid.

URINE.—Two glass test should be made to determine whether or not there is an accompanying urethritis.

TREATMENT.—The prepuce should be gently retracted if possible or if not supraputial infections and bathed in mild hot antiseptic solutions. It is then dried, the surfaces touched with cupric sulph. solution (10 grs. to the oz.) and dusted with stearate of zinc or preparations of calomel and bismuth, boric acid, etc. Lotio Nigre kept on a thin layer of absorbent cotton continuously moist interposed between the two mucous membranes is also an excellent dressing. Circumcision should then be advised to prevent recurrences.

HERPES PROGENITALIS.

These occur in the form of small vesicles in distinct groups, situated upon an erythematous base of the skin or mucous membrane of the prepuce. They tend to ulcerate, but are of short duration and recur, periodically, seldom attended with any pain.

CAUSE.—Not definitely understood, but may be predisposed by sexual excesses, phimosis, balano-posthitis, and gouty diatheses.

DIAGNOSIS.—The history of the existence of any of these causative factors, of frequent recurrences and the punched appearance of the ruptured vesicles are sufficient to render their recognition easy.

TREATMENT.—Removal of cause if ascertained, absolute

cleanliness, and dusting powder of stearate zinc are usually all that are necessary to effect a cure. In most cases circumcision should be advised.

PAPILLOMATA.

SYNONYMS.—Venereal warts, verruca, vegetations.

Papillomata are simply warty excrescences. They are cauliflower in appearance and are seen most commonly on the corona sulcus. They arise as a result of irritating discharges or from friction with adjacent surfaces. Pathologically these growths consist of hypertrophic changes of the papillary layer.

DIAGNOSIS.—Must not be confounded with syphilitic condylomata and epithelioma.

TREATMENT.—The measures for removing these warts are both surgical and medical. Circumcision should be performed if they are on the foreskin. Otherwise the growths if small may be touched with some mild acid, lactic acid, preferably. If this is not effective remove them at the base with a sharped curved on the flat scissors, and touch the floor with lactic acid. The Paquelin cautery may be used to control the bleeding.

CARCINOMA OF THE PENIS.

Malignant warts commonly begin in the form of a venereal wart and in other instances as a simple nodule or excoriation. This temporarily remains indolent or soon progresses toward degenerative changes.

CAUSES.—Predisposing malignant conditions are the age, redundant and uncircumcised foreskin, chronic balanoposthitis and filth, etc. It may arise as a result of extension from contiguous structures.

DIAGNOSIS.—In individuals past middle life, growths about

the genitalia should always be regarded with suspicion and the nature of it must be clearly proven by the microscope. It may be differentiated from gummata by observing the effects of mixed antisyphilitic treatment. Phagedenic chancreoids may often be confounded with malignant growths on the penis.

PROGNOSIS.—Operative treatment is imperative. Early amputation of the penis with extirpation of the glans in the groin is, in most instances followed by a permanent cure.

TREATMENT.—Partial or complete amputation.

TECHNIC OF PARTIAL AMPUTATION.—A catheter or sound is passed into the urethra for most of its length. A tourniquet is then applied at the root of the penis. The healthy skin wide of the growth is cut through with a circular sweep of the knife, and turned back an inch. The corpora cavernosa is divided down to the corpora spongiosum, which with the urethra is left to project for about an inch. This is then cut through above and below. The tourniquet is removed, bleeding vessels are carefully tied and the cutaneous margins and the mucous membrane of the urethra brought together by firm medium sized catgut sutures.

A catheter is allowed to remain in place so as to protect the dressings from being soiled by the urine.

COMPLETE EXTIRPATION.—This includes the removal of the penis down to its root, also the inguinal and crural lymphatic ganglion. The operation is as follows: The scrotum is divided into two halves by an incision along the entire line of the raphe back as far as the corpus spongiosum. A sound bougie is passed into the urethra for about two-thirds of its length and held vertically by an assistant. The corpus spongiosum is carefully separated about as far back as the triangular ligament, wide of the diseased area. The bougie is

then withdrawn, the urethra is then divided and carefully dissected out. All bleeding vessels are ligated. The principal blood vessel encountered in this operation is the dorsal artery of the penis. An incision now is made encircling the penis at its root, on either side up to the central incision below. The suspensory ligament is then cut through and the crus detached from the rami of the pubes. The urethra is now slit up vertically and stretched to the lower angle of the wound in the scrotum.

The subsequent treatment involves frequent dressing, strict observance of every antiseptic precaution, and continuous drainage of the urine by means of a small soft rubber catheter.

The testicle may in some cases be removed for the purpose of ridding the patient of any future sexual desire. The urethra in such instances is sutured to the lower angle of the wound in the perineum.

SARCOMA.

May occur on the penis and are usually the result of secondary involvement of other parts.

Symptoms and treatment are practically the same as in carcinoma.

HYPOSPADIAS.

This condition is quite commonly seen and consists in a congenital deficiency of the corpus spongiosum and floor of the urethra (see Plate I). A distinction has been made as to the location of this defect. When it occurs at the end of the urethra just at the base of the glans it is termed balanic hypospadias and anywhere between this point and the peno-scrotal junction it is termed perineal hypospadias. (Fig. 17.

The urine is ejected through the abnormal opening but otherwise the function is not impaired.

TREATMENT.—In most instances operative treatment for these conditions are not necessary, unless the function of the



FIG. 17.—Perineal hypospadias. (*Am. Text Book G. U. Dis.*)

part is impaired. Plastic operations when skillfully performed will relieve the condition, but should never be done upon infants. The child should be at least ten years old, and even then its results are uncertain.

EPISPADIAS.

This condition is practically the same as hypospadias, in that there is an absence or deficiency of the urethra, but

involves the upper surface of the urethra. This affection is much more rare and is always congenital.

TREATMENT.—The plastic operations of Thiersch and Dolbeay may be performed after the tenth year.

JUXTA—URETHRAL SINUSES.

This affection complicating gonorrhœa is very commonly the source of a persistent discharge from the meatus and unless a very careful examination of both lips is made, may be frequently overlooked. Juxta-urethral sinuses usually appear in the middle of the lip of the meatus on one or both sides. They run parallel with the urethra and often communicate with it by a fistulous opening into the fossa navicularis. These infecting sinuses may repeatedly be the source of auto-infection or may even inoculate the female coming in contact.

TREATMENT.—An attempt to obliterate the sinus by the injection of a drop of nitrate of silver solution 15 gr. to the oz. previously cleansing the part and then introducing the irritant by means of a blunt needle and hypodermic syringe. When this is unsuccessful, it must be laid open by an incision along its entire length with a very small tenotome and then touched with stimulating agents each day and allowed to granulate from below. Sometimes the sinuses may be obliterated by the quick introduction and immediate withdrawal of a thin red hot wire. This is always attended with great pain, and rarely successful.

PERIURETHRAL ABSCESESSES.

Periurethral phlegmon may occur anywhere along the course of the urethra as far back as the bulb. They usually begin as a small nodule, slightly tender, and increasing gradually or rapidly in size and eventually forms an abscess.

This may be unilateral or bilateral and round or globular in shape. The act of urination is usually interfered with more or less, as they increase in size.

The *crypts of Morgagni* or the follicles of the glands of Littre are often the seat of the infiltration of inflammatory exudate. These are felt at first as small shot-like bodies in the substance of the corpus spongiosum. It is most frequently seen in the subacute stages or after the cure of gonorrhœa. This deposit however in many instances is the beginning of an abscess, and the danger of urethral fistulæ are imminent. As the process of suppuration goes on, the swelling and inflammation increases and when the abscess cavity is opened it is often found to contain several drachms of pus.

Sometimes these threatened abscesses undergo resolution which may or may not leave a nodule as the focus. They recur upon the least indiscretion consequently, they are a frequent source of annoyance and menace to the comfort of the patient. When fistulæ are formed a plastic operation is necessary.

ABSCESS OF COWPER'S GLANDS.

SUPPURATIVE COWPERITIS most frequently occurs during the stage of decline of gonorrhœa or later. The involvement may be unilateral or bilateral. They are peculiar in that they are seated on either side of the raphé, at about the penoscrotal junction; or slightly posterior to it.

THE SYMPTOMS are pain and a feeling of heaviness and tension in the perineum, or in the region of the bulb, which is made worse by sitting, or in walking. These symptoms may become quite severe and are accompanied by chills, fever, and malaise, sometimes dysuria and retention from pressure. *Examination* of the part finds it a tense, swollen, red mass

pointing forward on both sides of the median line. Should the abscess become very large the perineum will also become red, cedematous and swollen.

Cowperitis may be *acute, chronic or suppurative*.

TREATMENT.—In the inflammatory stage lead water and laudanum, or cold applications to the part often give relief. Soon as suppuration occurs and fluctuation is noticed, a free incision should be made over the abscess, its contents thoroughly evacuated, irrigated with warm bichloride solution 1-2000, or normal salt solution, and then packed with iodoform and sterilized gauze. Fistulæ very rarely develop as a result of Cowperitis.

PRIAPISM.

Priapism is a condition in which there is an involuntary and persistent erection of the penis minus sexual desire,—resulting as a rule from such causes as:—inflammatory swelling of the penis, hæmatoma, phimosis, vesical calculus, stricture and more rarely leukemia and gout. The lesion may be in the upper portion of the spinal cord. Excessive or violent coitus may also be a causative factor.

The erection often originally begins with some sexual desire soon becoming obstinate. It appears suddenly and persists for weeks and even months. The condition is generally painful and the act of urination is impaired.

TREATMENT.—Nervous sedatives, e.g. sodium or potassium bromide, morphia, etc., should be given. Cold applications are often beneficial in allaying the pain. Incisions into the corpora cavernosa may also be advised. Some severe cases of priapism are followed by impotence, which, if possible, should be averted.

Neuralgia of the penis is of the reflex type and is caused

by some vesical or pelvic disease. Persons of gouty diatheses are also prone to this affection.

Tumors.—Besides papillomata of the penis there may be found other growths of both the benign and malignant type. The benign tumors occurring most commonly on the penis are: chondromata, osteomata, angioma, sebaceous and dermoid cysts. Sarcoma and carcinoma represent the malignant tumors. Carcinoma of the penis is by far the most common of the malignant type.

Gangrene.—Gangrene, usually of the moist type, occurs sometimes in individuals whose vitality is at a low ebb, by reason of some exhaustive infectious fever, e.g. typhoid and malaria: and in the debilitated. It may also arise as a result of injury or of inflammation. The gangrenous process is in most instances confined to the prepuce and glans, but may be quite extensive.

TREATMENT consists in keeping the parts dry and clean as possible. Perineal drainage is indicated when the urethra is involved. This, incidentally, prevents the dressings, etc., becoming soiled by the urine, which would otherwise occur. The penis should be elevated and hot fomentations continually applied.

Elephantiasis of the penis is rarely seen in this country. It is however very frequently met with in the tropical and sub-tropical countries.

The organ assumes enormous proportions and is due to hypertrophy of the cellular tissues.

Lymphangitis occurs commonly as a result of chancre, chancroid or mixed infection or in gonorrhœa. The condition may be simply temporary or persist for a long period of time.

Phlebitis often resembles lymphangitis and frequently

accompanies it. The veins involved are nearly always superficial. Commonly, it is limited to one vein.

Cavernitis or penitis as it is sometimes called, is an inflammation of the corpora cavernosa, usually due to folliculitis or extravasation of urine. The condition may be extensive, resulting in sloughing of the erectile tissues. The symptoms in the beginning are, œdema of the prepuce, induration of the corpora cavernosa, and priapism which is painless.

TREATMENT.—Free incisions into the capsule immediately. The erectile powers of the affected side are always more or less impaired.

The benign new growths of which the penis may be the seat are; sebaceous tumors, nævi, varicose conditions and fatty tumors.

Fracture of the penis is rare; the most common cause is forced coitus, though it may occur from trauma during chordee.

SYMPTOMS are those of extravasation of blood. Gangrene and pyemia and extravasation of urine may result.

Curvature.—This anomalous condition is seen sometimes where there is contraction or shortening of the frænum, or from adhesion with the scrotum in case of hypospadias. **TREATMENT** depends upon the cause. Relief is usually obtained by surgical intervention.

CHAPTER IV.

STRUCTURE OF THE URETHRA.

The Anatomy and Physiology of the Urethra.

The urethra is a musculo-membranous tube extending from the meatus urinarius to the bladder, which for clinical considerations may be divided into two parts: (1) *the anterior urethra or pars anterior* and (2) *the posterior urethra or pars posterior*. The dividing line of these anatomical divisions is the anterior leaflet of the TRIANGULAR LIGAMENT.

The urethra by some authorities is divided into three portions. The **penile, membranous, and prostatic urethra**. In the adult male the penile, spongy or pendulous urethra, is about six inches in length and extends from the meatus urinarius to the opening in the triangular ligament, where it joins the membranous portion. This constitutes the anterior urethra. The two latter divisions, membranous and prostatic, constitute the deep, fixed or posterior urethra. The membranous portion is about $\frac{3}{4}$ of an inch in length, and extends from the anterior to the posterior leaflet of the triangular ligament. The prostatic urethra averages $1\frac{1}{2}$ inches in length, and lies between this latter layer of the triangular ligament and the bladder. (Figs. 18 and 19.)

The *meatus urinarius* is the narrowest portion of the canal and its function is to direct the outflow of semen and urine. It varies considerably in size, but normally is about twenty-eight millimeters, in its diameter, but is sometimes narrowed

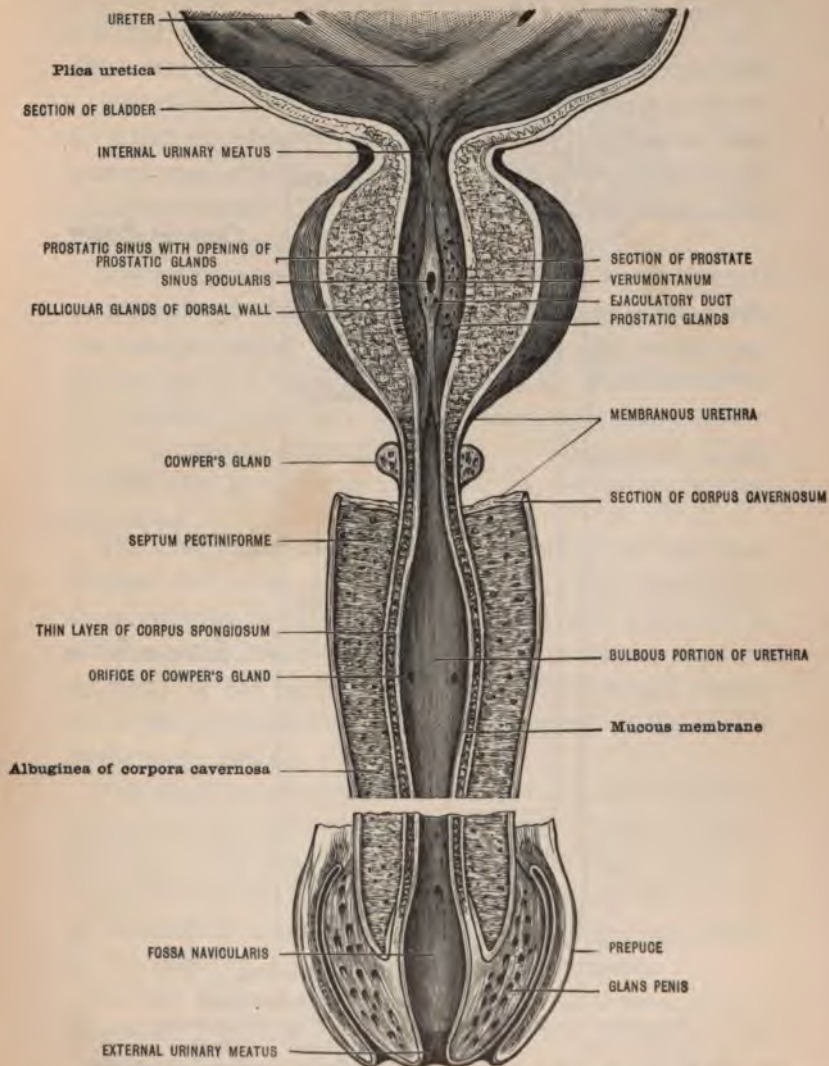


FIG. 18.—Male Urethra, showing ventral mucous wall. (After Morris.)

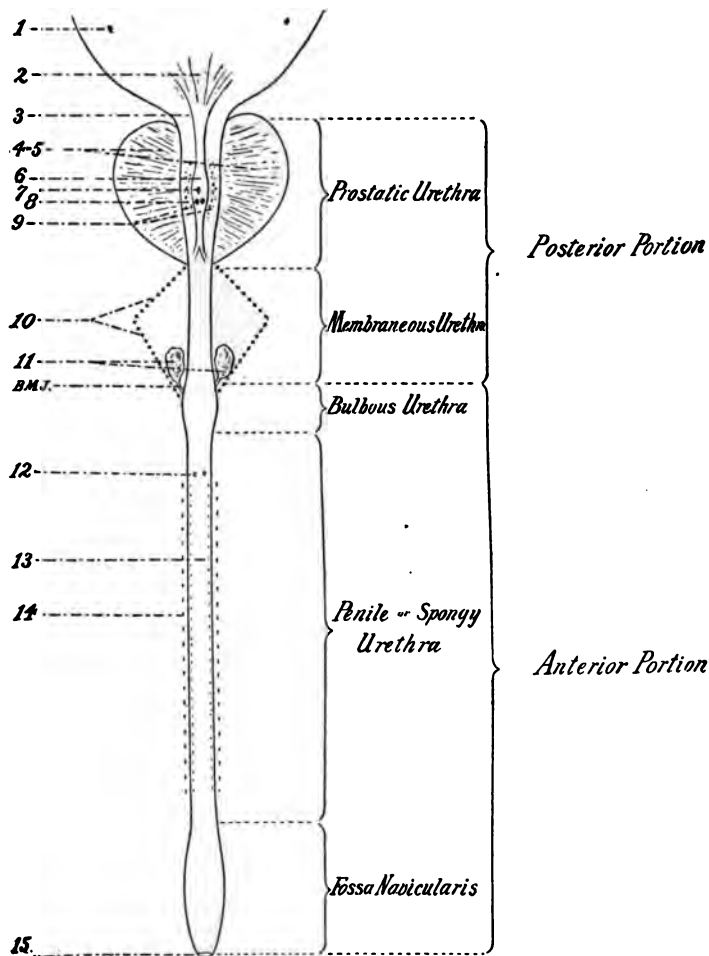


FIG. 19.—Diagram of the male urethra.

- | | |
|-----------------------|-------------------------------------|
| 1. Ureteral orifice. | 9. Prostatic sinuses. |
| 2. Trigonum vesicæ. | 10. Triangular ligament. |
| 3. Vesical outlet. | 11. Cowper's Glands. |
| 4. } Prostate gland. | B. M. J. Bulbo membranous junction. |
| 5. } | 12. Lacunæ magna. |
| 6. Verumontanum. | 13. Crypts Morgagni |
| 7. Sinus pocularis. | 14. Glands Littre. |
| 8. Ejaculatory ducts. | 15. Meatus urinarius. |

by the thick floor of the FOSSA NAVICULARIS, in which instance, when it is associated with urethral disease or reflex disturbances, it becomes necessary to perform a meatotomy.

Oftentimes the narrowed condition of the meatus is due to a thin membranous fold or congenital band at its lower commissure, which is dilatable, and therefore, is of no surgical importance. (The entire female urethra averages about two inches in length.)

The *corpus spongiosum* forms a vestment for the PENILE or PENDULOUS URETHRA, hence, it is sometimes referred to as the spongy urethra. Imbedded in the mucous membrane of this section is a large number of mucoid glands known as the GLANDS OF LITRE, which communicate with the urethra, through the SINUSES OR CRYPTS OF MORGAGNI. These follicles play a very important rôle in the various urethral affections.

The MEMBRANOUS urethra is surrounded by the *compressor urethræ* and *accelerator urinæ* muscles. The function of these muscles is exceedingly important and according to Lydston, the membranous portion constitutes the true sphincter of the bladder, which is under volitional control, while the sympathetic nerve fibres supplied to the muscle preserve its tonicity.

The steady pressure of the *detrusor urinæ* muscle is enabled to overcome the slight remaining resistance of the true vesical sphincter, with resulting voluntary micturition. Direct or reflex excitation of this portion of the canal is likely to result in retention of urine. Paralysis of the membranous urethra on the other hand producing urinary incontinence.

On the floor of the PROSTATIC URETHRA there is a slight elevation of the mucous membrane which is called the *Verumontana*. The supposed function of this structure is to

prevent the regurgitation of the seminal secretion. Here the *ejaculatory ducts*, which are the outlets of the seminal vesicles, communicate with the urethra and also the *sinus pocularis*, through which prostatic fluid makes it exit.

The total length of the urethra varies in different individuals, but averages approximately from eight to nine inches. The function of this canal is intimately concerned in both urination and the reproductive processes. While in the pendulous urethra the curve may be adapted at will, it is the reverse in the posterior portion, which is practically a fixed tube, therefore, this fact must be remembered during the passage of steel instruments.

The *triangular ligament* or deep perineal fascia as it is sometimes called, is divided into two layers or folds, anterior and posterior, in which lies the membranous urethra. Between these folds are also the Cowper's glands, which empty their secretion into the urethra, through a duct opening in the bulb directly in front of the anterior layer of the triangular ligament. Therefore, when the glands become involved, the infecting process is merely an extension from the anterior urethra, and thus, is a complication of anterior urethritis.

Another very important structure closely allied to the urethra is *Buck's fascia*, or the deep layer of the superficial perineal fascia. It is attached laterally to the rami of the pubes and ischia, and posteriorly to the triangular ligament, thus preventing extravasations of fluids into the perineum. By reason of its continuation with the abdominal fascia, above, it prevents extravasations into the abdomen. In its downward course Buck's fascia divides into two layers, forming a vestment for the corpora cavernosa and spongiosum and then in resemblance to an apron, dips downward into the perineum. The anatomy of the triangular

ligament and Buck's fascia is extremely important in considering urinary extravasations.

AFFECTIONS OF THE URETHRA.

Urethral calculi.—One or more calculi may be lodged in any portion of the urethra. They originate in the kidney or bladder but become impacted in the narrow tract and here may attain considerable proportions, so as to impede the outward flow of the urine.

DIAGNOSIS.—The presence of the urethral calculi is readily detected by palpation along the floor of the urethra, or by the use of the endoscope. The passage of a bougie will impart a grating sensation to the fingers, and may more or less obstruct the passage of the instrument.

TREATMENT.—They may be removed under local anæsthesia, by means of an alligator forceps. If this fails a small incision must be made at the seat of the lodgment, and the stone removed through the wound. A soft rubber catheter is now introduced into the urethra via the meatus and around it the opening is sutured.

FOREIGN BODIES.

The entrance of foreign bodies into the urethra is often effected for the purpose of sexual gratification, or by the accidental breaking of some urethral instrument, e.g. filiform bougies, etc. The symptoms and treatment are practically the same as those of urethral calculi.

STRICTURE OF THE MALE URETHRA.

By the term stricture is implied a stenosis or diminution of the calibre of a portion of the urethra. The lumen is

narrowed as a result of contraction in some localized chronic inflammatory process, giving rise to permanent cell changes with small cell infiltration into the submucous layers of the urethra and chronic catarrhal inflammation of the overlying mucous membrane. The dilatability of the tissues is thus impaired, interfering more or less with the function of the tract. This condition is in 90 per cent. of cases the sequel of gonorrhœal infection, but may also result from traumas, e.g. from unskilful use of urethral instruments, etc.

There are two distinct types of stricture, namely, the *congenital* and the *acquired*. The congenital variety is comparatively rare. The calibre of the normal urethra averages from 27 to 30 French. Every urethra presents its own calibre and dilatability, hence it is difficult to lay down any specific dimensions of just what constitutes the normal calibre. The widest portions of the urethra vary from 30 to 40 F. The latter dimension represents the middle of the prostatic urethra. The common SEAT of stricture is at the junction of the *membranous* and *bulbous urethræ*. Strictures occurring in the pendulous urethra are nearly always gonorrhœal, and are usually resilient. The terms **hard**, **semi-fibrous**, and **soft strictures** are descriptive of their density according to the extent of fibrous proliferation.

These connective tissue changes are as a rule limited to the submucous layers only, but may later involve the muscular layer also. The morbid process, instead of remaining localized at the bulbo membranous junction, may extend over the entire membranous urethra, but this fortunately is rare. Gonorrhœal stricture never occurs in the prostatic portion.

Causes.—*Gonorrhœa* is the chief cause of acquired stricture. *Trauma* is the next most frequent cause. Rare

cases have been chronicled in which the stenosis has been ascribed to the healing of chancre and chancroid, also scleroderma and keloid of the glans penis.

STRICTURE OF THE FEMALE URETHRA.

This affection is comparatively rare. It may be found in lithæmic subjects and in masturbators also, as a result of laceration by the introduction of foreign bodies, used for the purpose of sexual gratification. It may also be caused by traumatism and chancres. The symptoms are chiefly those of an irritable bladder. Some cases present a nodular condition of the urethra felt distinctly by pressure of the finger along the floor of the canal. The passage of urine may be interfered with or completely obstructed. Retention is usually caused by exposure to cold, sudden changes of temperature, alcoholic or sexual excesses.

TREATMENT.—The urethra being rendered surgically clean, an incision is made on the upper and lower wall of the urethra employing for this purpose a straight blunt tenotome or bistoury or a Gouley's beaked bistoury. This should follow by hot boric or diluted silver irrigations. The latter is especially indicated if the bladder is infected.

CONGESTIVE OR INFLAMMATORY STRICTURE.

The so-called congestive or inflammatory stricture is really a complication of a pre-existing organic stricture which in consequence of a debauch or sexual excesses, cold, horse-back riding, violent exercise, etc., becomes congested and inflamed at the narrowed portion of the canal. It is usually of short duration, however, and its treatment is the same as for spasmodic condition.

TRAUMATIC STRICTURE.

As its name implies, is caused by injuries, e. g. falls or kick in the perineum. The seat of such strictures is generally at the triangular ligament, and but very rarely in the pendulous urethra. The narrowing is due to cicatricial contraction and will not yield to gradual dilatation. It becomes necessary therefore in most cases to do a perineal section.

CLASSIFICATION OF STRICTURE OF THE MALE URETHRA.

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- | | |
|---------------|------------------|
| 1. SPASMODIC, | |
| 2. ORGANIC, | { (a) Congenital |
| | { (b) Acquired. |
-

ACQUIRED STRICTURE.

CLINICAL FEATURES.	CHARACTER OR DENSITY.	VARIETY.	SIZE.	CAUSES.
Simple, uncomplicated or dilatable.	Soft.	Linear.	Calibre.	Traumatism.
Spasmodic.	Semifibrous.		Above	
Irritable.	Fibrous or	Annular.	15 F.	Mechanical
Inflamed.	inodular.		large.	or Pressure.
Resilient or elastic.	Cicatricial			
Recurrent.	or nodular.	Tortuous.	Below	Congenital.
			15 F.	
			small.	Gonorrhœal.

Congenital stricture.—This malformation, due to defective foetal development, is much commoner than one would be led to suppose from the very scanty literature on the subject. The chief points to be borne in mind are: (1) that the urethra is formed by three embryologic portions: (a) the posterior *urethra* developed from the urogenital sinus, and separated

from the next portion by the cloacal membrane; (b) the spongy portion developed from the urethral groove and closed during the first stage of its development by the cloacal membrane, at its posterior extremity, and the epithelial wall of glans, at its anterior; (c) the balanic portion developed independently.

(2) The spongy and the balanic portions; i.e. the whole anterior urethra are not derived as the posterior, from a hollow embryonic organ, but, on the contrary, developed in a solid, continuous mass of epithelial cells. It is therefore not surprising that congenital strictures are more common in the anterior than in the posterior urethra. The contraction is usually at the meatus or distal end of the fossa navicularis due to a partial occlusion by a thin membranous septum or band at the lower commissure of the opening. Nocturnal incontinence and diurnal frequency of micturition are characteristic features. Incontinence in children, if not accounted for by some evident external malformation, is frequently due to a congenital stricture and not to "essential incontinence," or to "congenital irritability," as it is usually alleged. In adults every stricture is not necessarily the result of trauma or gonorrhœa, and gonorrhœal strictures develop much more quickly on the basis of an already existing congenital stenosis. The treatment is gradual dilation, only rarely is it necessary to resort to internal or external urethrotomy.

SPASMODIC STRICTURE.

URETHRISMUS as it is sometimes called, or, spasmodic contraction of the urethra may occur in patients of a high nervous temperament in whom even the passage of an instrument excites a spasm of the urethral walls as a result of a reflex contraction of the muscular fibres firmly grasping the instrument as it is withdrawn. The stenosis may occur in

any portion of the canal due to contraction of the circular fibres of the muscular layer but in most instances the cut off muscle is the factor chiefly responsible for spasmodic contraction. Therefore the principal seat of this form of stricture is in the membranous urethra.

The CAUSES may be *predisposing* or *exciting*. The predisposing factors are (a) hyperæsthesia, (b) acute and chronic diseases of the urinary organs, i.e. granular and congested patches, (c) abrasions or lacerations occasioned by an instrument, (d) hyperacidity of the urine—irritation, (e) irritation about the rectum from the presence of tapeworm, hemorrhoids, fissure of the anus, fecal accumulation, operation upon the rectum, testes or cord, passage of instruments, sexual excitement or reflex irritation.

Exciting causes.—Stone in the bladder or urethra, organic stricture of the urethra, a full bladder, sudden temperature changes, fright and gastro intestinal disturbances, drugs, e.g. cantharides and turpentine.

DIAGNOSIS.—In determining whether the inability to voluntarily empty the bladder is spasmodic or not, it is, in the majority of cases comparatively simple. The history of its sudden onset, a survey of his general condition and an examination of the urethra and prostate wall will usually furnish sufficient data to establish the nature of the obstruction.

TREATMENT.—The source of the irritation, whether local or reflex must be ascertained and then removed. The urine must be kept non irritating by the administration of alkaline waters and the avoidance of stimulating or charged drinks, highly seasoned foods. Antispasmodics or sedatives should be given and further instrumentation of the urethra stopped. The hot sitz bath and a $\frac{1}{4}$ gr. morphia hypodermatically and ten grs. quinine are usually sufficient to relax the spasm.

These measures may be still further supplemented if necessary by a hot application over the pubes and a hot lemonade to produce active diaphoresis. Should these efforts fail, a small size soft rubber catheter may be introduced while the patient is still in the bath. For further treatment of this condition see chapter on retention of urine.

ORGANIC STRICTURE.

This is the form of stricture which is due to a deposit of connective tissue, with fibrous contraction. It may be congenital or acquired. It is most commonly the result of urethritis.

PATHOLOGY OF STRICTURE.

Assuming that the narrowing within some portion of the urethra is due to urethritis, usually chronic, there first occurs an infiltration of newly formed submucous tissue, which diminishes the calibre of the canal and from the character of its density is called "soft stricture." Eventually this tissue becomes more inelastic as a result of further submucous connective tissue proliferation, which condition is called semi-fibrous stricture. They are both "succulent" until condensation still further ensues when the terms nodular, fibrous, or hard strictures are applied to it.

The new connective tissue formation, whether it be *linear*, *annular* or *tortuous*, may lie very superficially without invading the wall of the urethra at all. In other cases the diminution in the calibre of the canal might be so marked involving extensively into the urethral wall almost down to the corpus spongiosum. The overlying mucous membrane is considerably thickened and vascular. The fibrous contraction causes the narrowing of the lumen with a proportionate degree of inelasticity.

VARIETIES OF ORGANIC STRICTURE.

The character of the narrowing presents three principal varieties, viz.: linear, annular and tortuous.

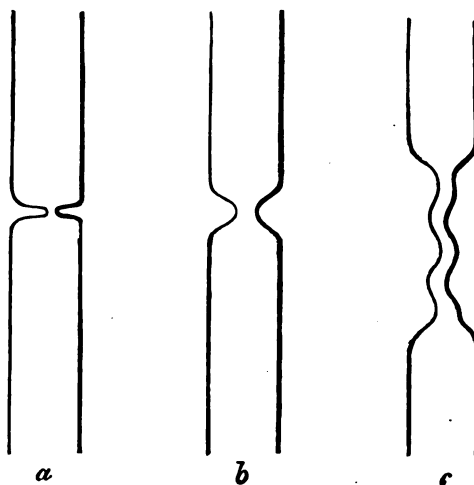


FIG. 20.—(a) Linear. (b) Annular. (c) Tortuous. (After Casper.)

These have been again divided according to their clinical features as follows:

- (a) Simple (dilatable).
- (b) Irritable (involving a condition of hyperæmia and hyperæsthesia).
- (c) Resilient or elastic.
- (d) Recurrent.

LOCATION OF ORGANIC STRICTURE.

The most common location by far is at or near the *bulbo-membranous junction*, (sometimes designated B. M. J.) although this has been the subject of much discussion. The next most frequent points are at the meatus or just *within it and the junction of the bulb and fossa navicularis*

or just posterior to it, i. e. two to three inches from the meatus; and least seldom about one inch anterior to the bulbo-membranous junction. Stricture never involves the prostatic urethra.

SYMPTOMS OF STRICTURE.

Almost the first symptom, or early in the formation of a stricture, there will be noticed a persistent discharge, mucopurulent in character, particularly in the morning on arising. Examination of the urine by the two glass test will find its substance perfectly clear and containing a few threads and epithelium.

The SUBJECTIVE SYMPTOMS present in this condition are, a *sense of burning during micturition*. There may or may not be *increased frequency of urination* with slight pain at its termination as in some cases which may be associated with a urethro cystitis or cystitis as often occurs in old cases. Sooner or later the patient notices that additional effort is required in the act of urination as a consequence of *impaired expulsive force*. The severity of this symptom is usually proportionate to the degree of contraction. In most cases the process of its formation is so insidious that this symptom may not be noticed, owing to the bladder gradually conforming itself by a compensating hypertrophy of the muscular fibres. *Alteration of the urinary stream* is another significant symptom. The changes noticed depend largely upon the contour of the narrowing. The character of the stream may be thin and twisted, *double or forked*, thick and broad, "fan-like" (Taylor). It may project strongly, with some *hesitancy* in starting and *interruption* during its passage. In *stances the parabolic curve is markedly diminished* *bling of urine after micturition almost invariably*

well advanced cases. This is obvious owing to the diminished elasticity of the urethral walls with imperfect closure of the canals and a consequent inability of the accelerator urinæ muscle to functionate completely. The hesitancy or difficulty in starting the stream becomes more marked as the stenosis or impediment increases. To overcome this the patient exerts himself more or less which is attended with pain and a *constant desire to urinate*, and when the act is begun, soon interrupted. The *pain* may be constant and dull or spasmodic in the glans penis simulating vesical calculi. The region of discomfort is suprapubic as a rule, but may radiate on to the perineum, pubes, testes, vas deferentia and groins.

HYPERTROPHY OF THE BLADDER walls (muscular layers and connective tissues) is another serious sequel which sooner or later develops in the course of stricture. The membrane assumes a villous appearance, presenting deep and thickened ridges. In some cases the reverse is true and as a consequence increased pressure exerted on the thinned walls. Rupture may occur with extravasation of its contents into the peritoneal cavity or pelvic connective tissue behind the posterior layer of the triangular ligament (see chapter on rupture of the bladder).

THE MORBID CHANGES IN THE URINE are highly significant when accompanying any stricture. From an acid reaction and slightly cloudy, it becomes opaque and ammoniacal and fetid, as a result of decomposition in the bladder. Not infrequently there may be emissions, organic impotence, pain on coitus with stabbing sensation accompanying the ejaculation. In not a few instances the irritation of stricture produces obstinate priapism and excessive desire.

Complications of stricture—Besides superficial and deep

ulcerations, false passages, infiltration and retention of urine, rupture of the bladder and pouch formation behind the seat of the stricture, there may develop abscesses and fistulæ. The abscess generally begins in inflamed follicles and burrows in any direction resulting in a fistulous opening in the perineum or scrotum. In old and advanced cases of stricture where the condition has been subjected to much instrumentation, there may develop abscesses of the prostate which sometimes discharge into the rectum, urethra or perineum.

The ureters themselves or together with the pelves—calices and infundibula may become more or less distended and thus become the seat of chronic inflammation. The patient under these circumstances soon declines in his general health. His appetite is poor, he loses weight and complains of pain in the back and loins. There is a constant desire to empty the bladder and when an attempt is made to accomplish the act it is attended with hesitancy and straining and ardor urinæ. Should he succeed in passing a few drops it will be found ammoniacal. The agony increases unless relief is given and the patient passes into a state of collapse, with subsequent urethral fever, or death will ensue from exhaustion.

Exploration of the urethra.—The diagnosis of organic stricture cannot be made without instrumental examination. Therefore any abnormal narrowing of the meatus must be enlarged to the normal calibre, i.e. 28



FIG. 21.—Conical steel bougie.

French (approximate) (meatotomy) so as to permit the introduction of the necessary instruments incidental to a thorough investigation of the canal. The instrument most largely employed in the diagnosis of stricture is the bougie, which may be flexible or of solid metal. These are graduated in size, according to the French scale, each unit of which represents one third of a millimeter. In other words an 18 F. bougie would be equivalent to 6m., a 24 F. to 8m., etc. The English scale ranges from 6 to 18.

Sounds.—The conical steel bougie, as it is often called, is said to be most useful when it has a short curve and a conical end. The entire instrument should be perfectly smooth and the point rounded but several sizes smaller than the shaft, giving it a conical form. The Van Buren sound fulfills these requirements and is largely employed. (Fig. 21.) A slight modification of the straight conical sound is found in the Beneque's bougie. This has a long double curve beginning almost at the middle of the shaft. The curve is thus designed to conform to the two curves of the urethra. The use of straight steel sounds is sometimes indicated, and particularly of value in strictures in the pendulous urethra.



FIG. 22.
Flexible,
olivary
bougie.

OLIVARY OR FLEXIBLE BOUGIES.—These are principally of rubber which may contain shot so as to better enable its passage by gravity. (Fig. 22.) In order for this instrument to be of service it should be perfectly smooth along its entire length. It should be sufficiently flexible to adapt itself readily to the course of the canal, but at the same

time must not be over supple.

The olivary tip and neck should taper so as to be several sizes smaller than the shaft. A complete set of these instruments is a most necessary adjunct to a genito-urinary equipment. The most useful sizes range from Nos. 8 to 24 F. When the case calls for an instrument beyond this measurement the steel bougie is preferable. The care of flexible instruments is important as they are expensive. They should be kept in a glass tube which must be perfectly dry and air-tight and kept in a cool place. If they tend to become gummy, powdered French chalk sprinkled over the surface will prevent their sticking together.

WHALEBONE FILIFORM GUIDES are particularly of service in cases of very tight stricture in which the lumen is so narrow and tortuous as to prevent the passage of even the smallest bulbous or conical bougie. When we have recourse to the filiform guide it may be necessary in order to find the opening to pass a number, say six or eight of these guides upon the point of coercion and manipulating successively one at a time, to enter the opening. Sometimes their introduction is facilitated by bending the whalebone about a $\frac{1}{2}$ inch from its tip. It is always well to inject 3ii of olive oil or iodoform emulsion into the urethra. This serves a twofold purpose; first, by lubricating the canal and secondly by distending the contracted portion of the urethra.

If after numerous attempts great difficulty is encountered in introducing the instrument it is safer not to withdraw it but to leave it remain, tying it in place; this will have the effect of continuous dilatation and will often save considerable trouble in getting through the stricture again.



FIG. 23.

Bougie a
boulé.

BOUGIE A BOULE.—This instrument consists of an acorn shaped tip or head, attached to a flexible or metal staff. (Fig. 23.) The sizes range from 10 to 30 F. They are extremely useful in detecting early morbid changes, i. e. thickening of the mucous membrane at any point along the anterior urethra.



URETHROMETER (Otis's) is useful in cases in which the meatus is abnormally small so as to prevent the introduction of instruments to explore the urethra. (Fig. 24.) It is especially of service in detecting points of narrowing, measuring the calibre and determining the dilatability of the urethra. **UNTOWARD EFFECTS OF DILATATION** are urethral fever, hemorrhage, false passages, acute inflammation of the prostate, urethra, bladder and epididymis.



FIG. 24.
Otis's
urethrometer.

EXAMINATION OF STRICTURES.

The principal points to be observed in the preliminary consideration of a case of stricture are to first ascertain the date of gonorrhœal infection, the age at which it was acquired, the duration, severity, etc., of the attack. The prostate and seminal vesicles should be carefully examined. The condition and function of the bladder and kidneys must likewise be inquired into. The urine should be examined for threads, blood, pus and casts. The general health and habits of the patient, his temperament, occupation, also constitute a vital question in the matter of treatment.

The next point to determine is the density of the obstruct-

ing tissue, whether it be soft, succulent or semi-fibrous, fibrous and inodular. The latter usually occur beyond the age of 35 or 40, therefore the age of the patient is always a significant factor.

Instrumental examination.—The first instrument which it is always best to use is an olivary bougie of about 20 F. lubricated with Lubrichondrin and gently introduced into the urethra and continuing it downward until the point of obstruction is encountered. If the instrument cannot be made to enter farther than its olive point, it must be withdrawn and a small bougie a boule about 12 F. carefully inserted. If this succeeds in passing the stricture much information as to its density may be obtained upon its withdrawal. Some prefer the filiform guide, over which the gouley tunneled catheter is passed. (Fig. 25.) In some cases it may be

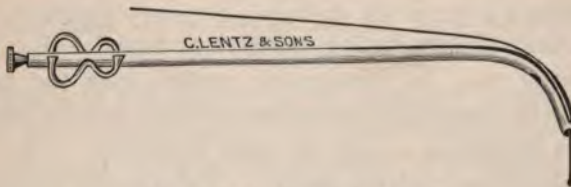


FIG. 25.—Gouley's catheter staff.

necessary to do a meatotomy in order to gain entrance to the urethra with these instruments. This procedure is therefore justifiable under such circumstances. Should it be possible to use a small size conical rubber or steel bougie, much information is often obtained by palpation with the finger tips along the floor of the urethra while the instrument is in situ. Areas of thickening, inelasticity, rings of indurated tissue, may be felt distinctly as far back as the bulb. In exploration of the urethra there is no occasion for causing the patient any pain and it must therefore be con-

ducted carefully and with the utmost gentleness. Undue force is always fraught with danger and nothing can be accomplished thereby. Patience and good judgment are at all times essential in urethral examinations. The glans penis should be cleansed with soap and water and rinsed with bichloride, care being taken not to get any into the urethra. If there be any urethral discharge the tract must be irrigated. All urethral instruments should be sterile and well lubricated. Should failure attend every effort to pass through the stricture it is deemed expedient to postpone further attempt, put the patient to bed, allowing him a light diet, and a purge so as to relieve any pelvic congestion. This rest and relaxation, with an opium suppository and hot bath, followed by hot poultices or hot water bag to the pubes, will in most cases relieve any spasmodic contraction or congestion of the stricture.

Technic of introducing catheter or sound.—A catheter or bougie may be comfortably passed with the patient either in the standing or recumbent position, but the latter for obvious reasons is always far more preferable. The glans penis should be rendered aseptic. The operator standing at the left of the patient raises the penis almost at a right angle to the body and retracts the foreskin. The instrument, well lubricated and still warmed, is held by the thumb and forefinger with the shaft parallel to the abdomen, the handle directed outward and towards the crest of the ilium. It is then slowly passed in without force by its own weight as it were. As soon as the least resistance is encountered, which is in most instances at the penoscrotal angle, the instrument should be slightly withdrawn, directing the tip to the upper surface of the urethra in order to escape the sinus of the bulb, and as it glides beneath the

pubes the handle and shaft of the sound are brought gently forward and down on the median line between the thighs when the point will usually enter the bladder. In some cases the passage of urethral instruments is facilitated by putting tension on the penis when the tip is beyond the penoscrotal angle so as to stretch the anterior leaflets of the triangular ligament. Difficulty in this procedure may often be overcome by simply pressing against the convexity or curve of the sound, by exerting gentle pressure beyond the scrotum or with the finger in the rectum in order to guide the tip towards the symphysis pubes. Skill in these manœuvres is soon acquired with a little patience and experience. Any undue force or improper manipulation will almost invariably excite spasmodic contraction of the compressor urethra muscle or of the involuntary muscular layers of the pendulous urethra.

TREATMENT OF STRICTURE IN THE ANTERIOR URETHRA.

Strictures in this portion of the canal are usually of the soft or semifibrous quality. The fibrous and inodular strictures are rarely found in this situation. The density of the contracting tissue, therefore, is the guide to the method of treatment. The semifibrous stricture is much benefited in the early stages by gradual dilatation with a straight conical steel bougie or by modified rapid dilatation. Should there be one or more areas or rings of fibrous infiltration with a calibre of less than 15 F. scale, dilatation is not indicated. This condition calls for an internal urethrotomy.

INSTRUMENTS FOR OPERATION UPON THE URETHRA.

The MAISONNEUVE URETHROTOME consists of a staff $9\frac{1}{2}$ inches in length of calibre 12 F., its upper surface grooved

and slightly curved at its distal end, which is tunnelled for $\frac{1}{8}$ inch. At the end of the stylet is a triangular blade with a blunt apex. (Fig. 26.) The filiform having passed down



FIG. 26.—Maisonneuve's urethrotome.



FIG. 27.—Gouley's beaked bistoury.

the urethra and into the bladder if possible, the grooved staff is inserted over the whalebone guide as far as the peno-scrotal junction, and then the stylet with the knife is slid

down slowly but firmly. In this procedure the penis should be held straight and tense. This instrument is especially adaptable for strictures of small calibre in the pendulous urethra. The urethra may thus be incised 18 to 24 F. Strictures seated near or at the meatus may be readily incised by simply using a straight blunt bistoury. (Fig. 27.)

The Maisonneuve urethrotome is a most excellent instrument especially where the point of coarctation is at or in front of the bulbo membranous junction or even in the pendulous urethra. It is especially valuable in strictures at the peno scrotal angle.

The TECHNIC of its application is as follows:—The filiform is first introduced as a guide and the shaft of the instrument made to follow it. Its entrance into the bladder is assured by touching its end with the finger in the rectum, the penis is stretched and the bladder carefully pushed down to the end of the groove dividing every constriction or obstructing tissue before it. In withdrawing the instrument every precaution must be taken to prevent laceration of healthy tissue. The blade must be kept exactly on the median line and the penis held tense.

Strictures in the anterior or pendulous urethra the calibre of which is 16 F. or over, will permit the passage of the CIVIALE URETHROTOME which is very useful in some cases. This instrument has a bulb at its distal end with a concealed blade which is quickly drawn out by pressing on a spring near the handle.

The OTIS DILATING URETHROTOME is of service in certain cases, when skillfully handled. The stricture to which this is best suited should be from 16 to 20 F. in calibre.

HORWITZ'S DILATING URETHROTOME. (For description and technic see page 116.)

Pedersen has devised a TUNNELLED and GROOVED SOUND and CATHETER, the curve of which is of the same radius as the standard urethral sound, but one inch shorter. This decrease in length has been compensated for by an increase of one inch in the length of the shank. The object and advantage of the short curve lie in the fact that there is very much less leverage on the face of a stricture in a short curve than in a long curve, thus lessening the danger of injuring the filiform and of making false passages in the urethra. The taper of the curve is uniform from its base to its tip and regularly includes six sizes from No. 12 F. upward. The length of the tunnel secures the sounds from twisting, breaking or cutting the filiform.

THE TECHNIC of employing these instruments is as follows: After the filiform has been inserted in the usual manner, the 6 F. catheter is passed over the filiform, the bladder, if distended, is partially evacuated through the silver catheter, or, if empty, is moderately filled with any mild antiseptic solution, such as boric acid, permanganate of potash, Thiersch or silver nitrate solution. The catheter is then removed, leaving the filiform in situ, and the sounds are taken in order, beginning with 8 F. and gently passed over the filiform through the stricture until that size is reached which the patient states to be moderately painful. The sound is left in situ for ten or fifteen minutes in order to get the full benefit of the dilatation. After this the filiform and sound are removed and the patient is allowed to evacuate the contents of his bladder. If the contents of the bladder be urine, as in cases of distention, the sound is removed and the filiform is left in place, and the silver catheter is then again passed and the bladder carefully washed with rather hot tiseptic fluid, some of which is left in the bladder to prevent

bleeding, such as sometimes occurs when an over distended bladder is emptied.

An opening may be thus effected to enable the passage of a sound 20 to 24 F. Dilatation must be persisted for at least once a week for a considerable period thereafter. Over dilatation is sometimes advised, but is always liable to recontraction.

Treatment of strictures of the deep urethra.—The method of treatment in contractions at or beyond the bulbo-membranous junction (B. M. J.) depends entirely on the density of the stricture. The soft or semi-fibrous variety should never be operated upon until every other procedure has been tried and has been unsuccessful.

Before any operation is performed in the urethra, the condition of the bladder and kidneys should be ascertained by careful examination of the urine—to determine the presence of albumen and casts and the percentage of urea. The amount of urine voided in 24 hours should also be noted. Then by means of a urethrometer and the bulbous bougie the nature, position, and calibre of the stricture are to be established.

The various methods of treating stricture in the posterior urethra are as follows.

1. DILATATION, $\left\{ \begin{array}{l} \text{Gradual,} \\ \text{Continuous,} \\ \text{Rapid,} \\ \text{Modified Rapid.} \end{array} \right.$
2. INTERNAL URETHROTOMY, Maisonneuve.
3. EXTERNAL URETHROTOMY, (For Drainage).
4. RETROGRADE CATHETERIZATION.
5. a. EXTERNAL URETHROTOMY, (Gouley's Op.).
b. EXTERNAL URETHROTOMY, with a guide. (Syme's Op.).

6. EXTERNAL URETHROTOMY, without a guide. (Horwitz's Op.).
7. EXTERNAL URETHROTOMY, without a guide, (Wheelhouse, Op.).
8. EXTERNAL URETHROTOMY, without any instrument in the urethra (Cock's Op.).
9. EXTERNAL URETHROTOMY, without any instrument in the urethra, (Gibson's).
10. DIVULSION OR RUPTURE.
11. ELECTROLYSIS.

Gradual dilatation.—The indication for this method of procedure, is where the stricture has not progressed beyond the semi fibrous stage. The advantages are that it may be easily performed and is attended with little or no pain. It is always good practice to attempt at least to restore the normal calibre of the urethra by gradual dilatation. The introduction of the sound or bougie must be gentle, starting with an instrument just large enough to pass through the stricture comfortably. This should be done every third or fourth day, passing the same size bougie two or three times, then advancing to the next number and so on. It is well in the beginning, especially when the calibre of the urethra is 10 or 12 F., to use the olivary flexible bougie, until 18 or 20 is reached, and then the conical steel bougie should be employed, increasing as the condition indicates gradually up to 32 F. and continuing with this number until it is passed easily and without undue resistance. The untoward effects or complications of gradual dilatation are, fever and chills, inflammation, urethral hemorrhage, and spasmodic retention. Should any of these occur, the treatment must be temporarily abandoned until the complication is overcome by proper treatment.

Continuous dilatation.—When the stricture has contracted down to a point where with great difficulty the filiform is passed, it is allowed to remain in situ, until the tissues relax and allow the passage of a larger instrument.

Rapid dilatation.—Is often resorted to after the filiform is passed through the stricture as a guide for the tunnelled sound, thus gradually increasing the number until 12 or 14 F. is reached. The result obtained by this process is only temporary as a rule, therefore it must be followed either by gradual dilatation or the more radical method of internal and external urethrotomy according to the density of the stricture.

Modified rapid dilatation is the treatment preferred by many surgeons, for strictures of small calibre in the membranous urethra. It is especially valuable in strictures which are not resilient, irritable or nodular. The advantages claimed for it are: that there is less tendency to relapse; is free from complications; is attended with but little or no danger to life, and the amount of bleeding is practically nil. The **TECHNIC** as given by Orville Horwitz is as follows: The urethra is flushed with a 4 per cent. boric acid solution and a sterilized filiform bougie passed and tied in place. The patient is kept in bed, given urotropin internally and the urethra irrigated daily for three days, at the end of which time the patient is ready for



FIG. 28.—Thompson dilator.

operation. The anæsthetic having been administered, the urethra is again washed with a 1-20,000 mercuric chlorid solution. The Thompson dilator (Fig. 28.) is then passed over the filiform and through the obstruction, when by means of a thumb-screw attached to the handle of the instrument the blades are separated to a slight degree; after remaining in this position for about a minute they are again

approximated. This procedure of alternate separation and approximation is to be repeated several times. Each time separating the blades of the instrument to a wider degree, until the stricture is enlarged sufficiently to allow of the insertion of the Gross dilator, (Fig. 29) the calibre of which is 18 F. each. The Thompson instrument is now withdrawn and the Gross dilator inserted, with which the calibre of the urethra is then brought to the full size of the canal, which has been previously ascertained by means of a bougie a boule. After the Gross instrument is removed, a full size conical steel bougie is passed to determine whether all the obstruction has been overcome. This condition having been found, the urethra is irrigated with a 1-20,000 mercuric chlorid solution and a sterilized catheter passed and tied in place. A small quantity of boric acid solution is then injected into and left remain in the bladder. The patient is kept in bed about four days, subsequently the urethra and bladder irrigated daily, and the catheter removed on the third day. A full size conical steel bougie is then passed and the patient may resume his vocation the following day, continuing with the bougie twice a week for about six weeks, then once a week every other week, etc.

FIG. 29.
Gross dilator.



The CONTRAINDICATIONS to this method of treatment are

in the aged or those suffering from diseases of the kidney, hence the importance of careful microscopic and chemical examination of the urine, preceding the operation; urinary fistulæ, and abscess of the perineum, render this method inapplicable. In patients contemplating marriage at an early date, this operation should not be advised.

Internal urethrotomy.—When performed in appropriate cases by means of the Maisonneuve instrument it is often productive of much good. It is particularly indicated in cases of fibrous stricture at or near the bulbo membranous junction. The preparation of the patient in all operations upon the urethra is practically the same, and is as follows:—The patient should be put in best possible physical condition, given tonics, etc., if necessary. The urine should be carefully examined. The bladder should be treated if there be any existing disease, and previous to the operation be irrigated with hot boric acid, salt or permanganate solutions. A day or two prior to the operation the patient should be kept in bed, kept on a light diet and an enema given the night before. The patient having been thus prepared is etherized, placed in the recumbent posture. The filiform guide of the Maisonneuve instrument is then passed down the urethra and into the bladder, followed by the groove conductor and the knife up to the point of coarctation. The penis is then held straight and tense, the knife slowly but firmly pushed down, directing the blade of the instrument toward the roof of the urethra in a median line. It is well for the surgeon to make sure of the position of the instrument, by feeling the staff of the instrument with the finger in the rectum. The incision should be made up to a calibre of 20 to 21 F. After this is accomplished the instrument is withdrawn and a soft rubber catheter is passed down the urethra into the bladder to drain

off any of the contained urine, and then to inject by means of a hand syringe about 4 to 6 drams of a weak silver solution, (1 to 4000) and allow to remain until the patient voids his urine. Two or three days later this injection should be repeated and then gradual dilatation may be commenced, continuing up until a calibre of 30 to 32 F. is reached.

OTIS'S DILATING URETHROTOME is a very satisfactory instrument used in performing an internal urethrotomy. The exact location of the stricture having been determined this instrument is passed down to a point about one-half inch behind the stricture. The blades are then separated until tension of the stricture is felt. The cutting blade is now withdrawn and then separated to the required extent. After this is accomplished, the blades are brought together again, and the instrument withdrawn. It is then well to explore the urethra with a full size bougie, so as to determine whether the stricture has been sufficiently divided. After this the urethra should be irrigated with a hot saturated solution of boric acid, the patient put to bed, and if there be much hemorrhage, cold applications made to the part. In the average case the enlargement of the urethra secured by either the Maisonneuve or Otis urethrotome, should be of a calibre of 30 to 32 F. The after treatment is largely symptomatic, meeting the indications as they arise. The bromides may be given for their sedative effect, salol to keep the urine bland and antiseptic, etc. By far, in the larger number of cases in which internal urethrotomy has been done, the result is permanent, hence, the subsequent use of bougie is usually unnecessary as a routine measure.

External urethrotomy.—The usual steps of preparing a patient having been taken, he is etherized and placed in the *lithotomy* position. The grooved sound is passed into the

bladder, and the scrotum is held out of the way by an assistant who at the same time steadies the sound. An incision is made for about two inches into the tissues, overlying the convexity of the staff. The urethra is thus exposed and a small incision made into it. The bladder is then drained with a large catheter or perineal tube inserted. This is anchored to the skin by a suture to hold it in place. This is often called the "boutonniere." This operation can also be performed for the purpose of removing calculi or concretions lodged in the prostatic urethra.

External urethrotomy without a guide, "GOULEY'S OPERATION." The patient being anæsthetized and placed in the lithotomy position, the filiform is inserted through the stricture and over this the Gouley tunnel catheter is passed. The assistant holds the end of the sound exactly in the median

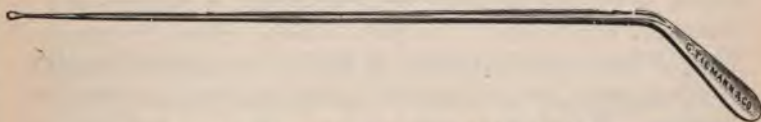


FIG. 30.—Arnott's small grooved silver probe.

line at right angle to the body, at the same time holding the scrotum out of the way. An incision is then made, carefully dividing the tissues, layer by layer from the base of the scrotum to within an inch of the anus. Guided by the sound the surgeon feels for the urethra and cuts carefully downward for about an inch, entering the canal. After the hemorrhage has been controlled a ligature two feet long, to be held by the assistants is applied and used as a retractor. A small grooved silver probe with a handle which can be bent to any angle is passed through the opening into the bladder from which Gouley's beaked bistoury is passed and the stricture incised

on its upper surface. The groove is then inverted by simply turning the probe and an incision made on the floor of the stricture. The stricture tissues having been thus divided, Teale's probe gorget (Fig. 31), is passed which readily allows the insertion of the catheter and perineal tube, through which the bladder is then thoroughly irrigated. This tube is allowed to remain in the wound for 5 or 6 days, and the bladder irrigated 2 or 3 times daily.

The tube is held in place by means of a ligature to the edge



FIG. 31.—Teale's probe gorget.

of the wound, around the end of which is well protected with iodoform gauze and a firm dressing held in place by a retentive bandage. Rarely does urinary fever, sepsis or hemorrhage follow these operations when performed with the proper antiseptic precautions. The hemorrhage which sometimes follows is readily controlled by pressure.

SYME'S OPERATION.—The technic of this method is practically the same as the Gouley, with the exception of the instrument in the urethra, which is known as the Syme's staff. This instrument, however, is more dangerous than the Gouley and more liable to cause false passages in the hemorrhage. The difficulty therefore, renders it less useful.

External urethrotomy without a guide through the stricture (WHEELHOUSE'S OPERATION).—The patient being etherized and in the lithotomy position, the Wheelhouse staff

(Fig. 32) is carefully passed down to the stricture, with its groove facing the floor of the urethra. An incision into the perineum is made, the tissues carefully dissected until the urethra is reached.

The canal is then opened on the groove of the staff. The staff is then withdrawn to the upper angle of wound and then turned so that its button puts the canal further on a stretch.

By this means the part is well exposed and the surgeon has little or no difficulty in forcing the grooved probe or gorget

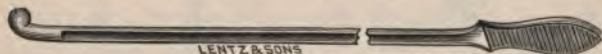


FIG. 32.—Wheelhouse's staff.

into its opening, traversing the stricture into the bladder. The stricture is then divided on its upper and lower wall by means of a probe pointed bistoury. The incision thus made into the stricture usually affords sufficient access to the bladder, but this opening may be further dilated by the surgeon inserting his forefinger into it. Subsequent proceedings are the same as described in the Gouley's operation. (q. v.)

External urethrotomy without a guide (Horwitz's operation, for perineal section).—In cases where difficulty is encountered in finding the urethra and in operations for stricture and ruptured urethra Orville Horwitz has devised an ingenious instrument which considerably modifies the Wheelhouse operation. The method is simplified by the substitution of a perineal staff.

The **TECHNIC** is as follows: By means of a dilator (Fig. 33), the passage of which is facilitated by threading it over a filiform bougie, until the instrument is arrested at the point of coarctation. An assistant turns the thumb-screw

separating the blades as shown in Fig. 34, the calibre of which is noted by an indicator on the handle of the staff.

The operator is then better enabled to make an incision directly overlying it. The advantages claimed for this in-

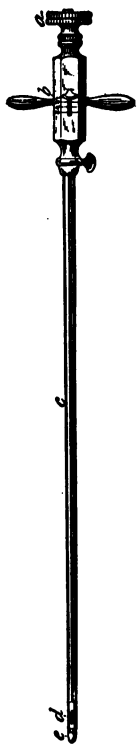


FIG. 33.—Horwitz's dilating urethrotome—closed.

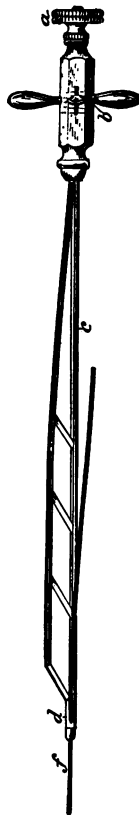


FIG. 34.—Horwitz's dilating urethrotome, with blades separated.

strument are that it not only fixes the urethra in one position but is made prominent by the expanded blades.

External urethrotomy without a guide (Cock's ope-

ration, for perineal section).—This operation is advisable where the perineum and scrotum become swollen, either as a result of an old long standing stricture or traumatism in which the urethra, anterior to the stenosis, is practically obliterated and therefore impermeable to instruments.

The patient being etherized, a last attempt should be made to pass an instrument through the stricture in the hope of paving a way, and providing a guide. Should this be unsuccessful he is placed in the lithotomy position. The operator seated in front of the patient, inserts the left forefinger into the rectum and its tip held firmly against the apex of the prostate. Then by means of a double edge knife or ordinary scalpel, with the cutting edge of the blade upward, an incision is made into the raphé, about an inch anterior to the anus, and carried forward in the direction of the finger tip, thus making a verticle incision. The bladder is then entered through the membranous urethra, and a large soft rubber catheter introduced and retained by a suture to the outer edge of the wound. Subsequently the bladder, by this means is frequently irrigated and within a few days the extravasation and swelling in the perineum subsides and the urethra, is re-established, which will then probably permit instrumentation.

Retrograde catheterization.—Conditions in which there has been rupture of the urethra and in which it is impossible to find the proximal end of the canal, retrograde catheterization must be resorted to. The operation is as follows: A small suprapubic incision is made on the median line, sufficiently large enough to allow locating the internal vesical orifice by means of the index finger. This being the proximal end, the catheter may be easily passed through the distal portion of the urethra. The catheter is allowed to remain for a

purpose of draining the bladder or to act as a guide in approximating the torn ends of the urethra, which may be sutured or allowed to heal by granulation.

Rupture or divulsion is a relic of surgical barbarism and is hardly worthy of mention. It consists simply of a rapid and forcible dilatation, with the object of rupturing the tissues and in most instances followed by inflammation, causing it to become resilient and irritable.

Electrolysis.—This method has few advocates. The object is to decompose and permit the absorption of the morbid tissues, by means of electricity. The method is attended with very little pain and practically no hemorrhage, and is never followed by any septic complications. Fort's electrolyser has been recommended and is only useful in cases where the Maisonneuve operation is indicated.

Urethrectomy.—In severe cases of stricture of the traumatic and inodular type, this method may be employed. The entire stricture or mass is excised and the ends of the urethra are approximated and sutured, or a catheter may be inserted, and the cut ends allowed to heal by granulation. This unfortunately is almost invariably followed by cicatricial contraction.

Retention of urine.—This condition may occur as a result of alcoholic excesses, exposure to cold and wet, sexual excesses, great physical exertion, in the declining stage of urethritis, and impacted calculus or foreign body, also from stricture, enlarged prostate, atony of the bladder, pressure from tumors, and unskillful instrumentation of the urethra. The inability to expel the urine contained in the bladder may be partial or complete, and is usually due to a sudden congestion of the urethral mucous membrane, or spasm of the compressor urethræ muscle.

SYMPTOMS.—On percussion, the bladder being found distended, there will be more or less local pain. The bladder will be distended and distinctly felt in the hypogastric region, extending up toward the umbilicus. It is more or less sensitive to touch. Dulness will be found on percussion. If this is not soon relieved the pain becomes intense and constitutional disturbances more marked.

There is usually an urgent desire to empty the bladder, attended with tenesmus, probably some rise in temperature and chills, and later a slight dribbling of urine as a result of an atony of sphincters. Cases have been reported where the condition has been allowed to go on for several days, in which rupture of the bladder, followed by peritonitis and gangrene, or abscesses of the kidney have ensued. Death from uræmic poisoning may also ensue in neglected cases.

DIAGNOSIS.—The only other conditions with retention confounded are pregnancy, and ascites.

TREATMENT.—This depends largely upon the cause, the knowledge of which should be our principal guide. Where the retention is due to urethritis, the urethra should be irrigated and a flexible catheter 20 F., well lubricated, should be passed until it meets with obstruction. At this point it is allowed to remain for a few minutes, depending on the condition, if it be spasmodic, to relax itself. If this is unsuccessful the patient must be given a hot bath, followed by $\frac{1}{8}$ gr. of morphia, and 10 gr. quinine, then put to bed and a hot water bag applied over the hypogastric, where the retention results from urethral stricture, this knowledge having been ascertained by a careful history. Relief may be obtained by the use of either the Thompson or Bumstead retention catheter or what is still better, inserting the filiform after it has passed through the stricture, followed by a small

Gouley tunnelled catheter into the bladder, by which the urine may be drained off. Hot rectal injections, suppositories of opium and belladonna are also useful as supplementary measures. If an impacted calculus be the cause it must be removed. The bowels should be opened as soon as possible, the urine rendered bland and unirritating, sedatives administered and the use of stimulants interdicted. Where bladder distention has been great, about half of the urine must be drained off at first, and several hours later the remainder, as there is liability to paralysis of the bladder due to sudden collapse of the over distended walls. In those neglected cases, where there has been some vesical, urethral and renal congestion, the vessels at first become suddenly depleted, then when the circulation is re-established hemorrhages occur, resulting in death.

Newly born infants may suffer with retention in consequence of an imperforate prepuce or imperforate meatus. In the former case it may be necessary to circumcise the patient and in the later case a meatus must be made, introducing a catheter if necessary. If it is due to a cyst in the sinus pocularis, as is frequently the case, it will be at once relieved by passing a small probe, rupturing the wall of the sac.

Tapping of the bladder.—Not infrequently when every means of reaching the bladder has failed, it becomes necessary to resort to aspiration. The instruments employed for this purpose are the Hayden's aspirator and trocar (see Fig. 40, p. 150), or ordinary long trocar and cannula. The pubes should be shaved and rendered surgically clean. The instrument having been carefully sterilized is inserted about one inch above the symphysis in the middle line, directing it downward and backward. This operation may be repeated

several times on the same day or subsequent days. Points of puncture may be closed over with flexible or iodoformized collodion.

Extravasation of urine.—This dangerous complication usually occurs as a result of some severe strain upon the urethral walls, in cases of tight stricture. The thin urethral walls behind the stricture (resulting from repeated efforts to expel the urine) forms a pouch like dilatation. After some violent efforts this weak tissue gives way, and the urine escapes into the urethral tissues. Abscesses situated anywhere along the course of the urethra may also predispose to extravasation of urine into the perineum. The seat of the *rupture* may be either as far back as the anterior leaflet or the triangular ligament, between these folds (membranous urethra), or behind the posterior leaflet of the triangular ligament; either at the junction of the urethra or in the prostatic urethra itself.

Rupture of the anterior urethra.—When the rupture occurs in front of the triangular ligament the urine burrows through the cellular tissues of the scrotum and penis, and extends upward toward the umbilicus. This is rather rare, however, and may be due to impacted calculus as well as stricture. There is always considerable swelling accompanying these conditions. The urine is prevented from escaping into the pelvic cavity or from diffusing itself down the thighs by the firm attachment of the perineal fascia to the ischiopubic line. In extreme cases the extravasation may extend up as far as the umbilicus. Unless this condition is immediately relieved, abscesses rapidly form, the tissues become gangrenous and slough, resulting in urinary fistulæ. The danger of sepsis is always imminent, and unless an operation is immediately performed, death may promptly ensue.

Rupture of posterior urethra.—When the rupture occurs posterior to the triangular ligament, the urine burrows into the deep layer of the perineal fascia and into the prevesical space, forming a swelling above the symphysis, or it may find its way into the rectovesical space with a consequent swelling in the perineum. The diagnosis is usually confirmed by rectal examination. When the extravasation takes place between the folds of the triangular ligament, the urine burrows into the perineum and scrotum or may take a backward turn into the pelvis, where it can be detected as a doughy mass by a digital examination of the rectum.

SYMPTOMS.—Usually there is a sudden gush of urine, but sometimes the extravasation may take place quite slowly. The patient feels a sensation of "something giving way," with a feeling of temporary relief, but when an attempt is made to urinate he finds himself unable to do so. Constitutional disturbances soon become manifest. There is a feeling of weakness, nausea, fever and chills. Upon examination the scrotum will be found distended and swollen, extending toward the abdomen. The skin is soggy and discolored, soon this changes to a purplish color and if allowed to continue will develop into gangrene, with sloughs of tissue coming away, often so far as to expose the testicles. Unless relieved by immediate operation the patient passes into fatal coma from uræmia and septicæmia.

TREATMENT.—Urinary extravasations demand the performance of an immediate external urethrotomy and the bladder drained and irrigated through a catheter or perineal tube, so as to prevent any further infiltration of urine into the tissues. Free incision should be made into any of the swollen tissues, all sloughs carefully removed and the part copiously irrigated with a hot bichloride solution (1 to 5000), or

saline solution. Any collections of pus should be opened, drained and packed with iodoform gauze. Extravasations into the prevesical space, demand the suprapubic cystotomy and the urine evacuated.

Dressing should be frequently renewed and any evidences of shock combated by the usual methods.

Urethral fever.—SYNONYMS.—Urinary fever, [urinary infection, catheter fever and urinary poisoning.

Occurs as a result very often of operations upon the urethra and bladder or prostate. SYMPTOMS of cystitis more or less observed, but is characterized by sudden rise in temperature preceded or followed by a chill. It occurs in forms, acute and chronic. The acute form may be noticed after gentle instrumentation of the urethra and bladder.

The chills will usually last about half an hour. The urinary secretion is lessened and in a few hours, when the temperature falls, there is a profuse sweating and an increase in the amount of urine voided, which if examined will be found to contain abundant urea and albumen. The rise in temperature is sudden and may reach 104 to 106 F. This condition may last one or several days and may recur at intervals. The chronic form is mostly observed in old patients, suffering from stricture, in whom there is a coexisting disease of the bladder, kidney or prostate which develops insidiously. The fever may be continuous or intermittent. The course of the fever, however, is prolonged, the patient fails in health, complains of malaise and dyspepsia and in the end succumbs to uræmia or septicæmia. In severe cases, there is usually suppression of urine.

TREATMENT.—In order to avoid urinary fever, all operations upon the urethra, prostate and bladder should be attended with strict antisepsis, and great care taken in the matter

of drainage and frequent irrigation. In a mild attack, all is necessary is rest in bed, giving the patient hot drinks, applying external heat and giving him salol or urotropin as urinary antiseptics; and small doses of quinine and opium. If there is any renal impairment, the urine being albuminous or bloody or suppression occurs, the patient should be given a hot bath and cups applied over the kidneys, plenty of diluent drinks, and, internally, large doses of digitalin or tincture of digitalis. If there be any shock it may be necessary to resort to venous transfusion.

CHAPTER V.

MISCELLANEOUS AFFECTIONS OF THE GENITO URINARY ORGANS.

Nocturnal incontinence of urine is a symptom, not a disease. The bladder is either wholly or partially unable to retain its contents. The age, the constitutional state, the hygienic surroundings, the social position, the past and present history of the patient must be taken into consideration before we can ascertain the etiology of enuresis. In the extremes of youth and senility, nocturnal incontinence of urine is most frequently encountered. Of the two, children of either sex up to the age of sixteen years furnish the larger number of cases. In old age it is usually due to atony, relaxation or paralysis of the sphincters at the vesical outlet, and is frequently associated with vesical calculi and cystitis, and diseases of the prostate. It should never be confounded with the incontinence due to retention. Nocturnal incontinence in middle life is often an early symptom of brain or cord lesions, e. g. tabes, and therefore must be treated accordingly.

In children it is usually due to spasmodic contractions of the detrusor muscular layer of the bladder; it is a reflex phenomenon due to an increased reflex excitability of nervous mechanism. An examination of the external genitalia will frequently reveal the presence of seat worms, contracted meatus, contracted or adherent or redundant prepuce, balanitis, pruritus, vulvitis or allied conditions, e.g. phimosis, adherent clitoris in females, etc.

Children most frequently suffering from nocturnal incontinence are of a weak, anæmic, poorly nourished type, the majority of them being from the poorer classes. As they grow older there is usually an abatement of the condition and it disappears entirely at about the age of puberty.

TREATMENT.—In all forms of nocturnal incontinence rest is of prime importance; the diet must be restricted, hygienic measures supported, and personal cleanliness insisted upon. The patient should be kept in bed if possible, and the etiology determined. The urethra and bladder must be examined by means of the sound, endoscope, cystoscope, etc., also rectal examination of the prostate and vesicles. Foods that are easily digested, are nourishing, and do not cause concentration of the urine are indicated. Acids should be restricted and larger quantities of water administered. Particular care must be paid to the general health of the patient, and remedies that will promote general nutrition, such as arsenic, iron, strychnine and cod liver oil will be found beneficial in a large majority of cases. The use of coffee and milk is interdicted. In atony, relaxation or paralysis of the sphincters of the bladder, the resulting incontinence can often be overcome by the employment of one drop doses of tincture of cantharides, three or four times a day, well diluted.

In such cases cantharides act almost as a specific. Liquor potassii arsenitis may with advantage be alternated with cantharides in treating nocturnal incontinence due to the conditions mentioned. The galvanic current is very useful in overcoming obstinate cases. The best means of employing it is by the use of a urethral electrode, the same to be introduced up to the bladder. The positive pole is *to be placed* over the fourth or fifth lumbar vertebra and the

negative attached to the urethral electrode. Only a very mild current can thus be employed, but after repeated applications decided improvement will be noticed.

When nocturnal incontinence occurs in children of the nervous type, the bromides and belladonna are useful. When any preparation of belladonna is used it should be preceded three or four days by the frequent administration of an alkaline diuretic.

If cystitis is the cause of the nocturnal incontinence, the bladder must have absolute rest. This is best accomplished by continual catheterism, a self retaining catheter being the best instrument to employ. The bladder should be thoroughly irrigated at frequent intervals with hot saline solution or sterile water. Salol administered internally will also do good. In such cases the urine must be rendered non-irritating.

When incontinence occurs as a result of concentrated or highly acid urine, the administration of an alkaline diuretic every three or four hours will relieve the condition. Some of the salts of potassium are very useful in cases of this description. The acetate of potassium combined with the bromide of potassium will be found beneficial.

If the incontinence is due to the presence of seat worms, in or around the genital organs, they must be removed and personal cleanliness enforced. When an adherent or contracted prepuce is the cause, circumcision must be performed. If contraction of the meatus is the cause, surgical correction of the abnormality will relieve the incontinence. Vulvitis and balanitis are frequently the causes of nocturnal enuresis and must be treated by the local application of antiphlogistic remedies.

In all cases of nocturnal incontinence it is wise to examine

the urine both microscopically and chemically, as it is often necessary to determine the cause by exclusion.

Atropine in enuresis relieves reflex activity; Holt advises 1-1000 gr. gradually increased to 1-100, three times a day.

Fl. ext. ergot, 30 drops three times a day.

Strychnia 1-100 gr. three times a day in children 4 or 5 years old.

Hyperæsthesia of bladder may be relieved by tr. hyocyamus.

Epidural injections have been proposed by Cathelin. Through its opening into the sacrum the sacral canal is reached, into which the injections are made between the periosteum of the vertebra and the dura-mater. An ordinary needle of an aspirating syringe is used for this purpose. Five c.c. of sterile salt solution are given in the first injection and at intervals of about a week gradually increased to ten or fifteen. Good results have been obtained by this method of treatment.

BACTERIURIA.

Very frequently cases are met with in which the urine is clear, only slightly turbid, and fetid, in which the patient complains of no ill feeling nor presents any symptoms or history of either cystitis or urethritis. The condition of the urine is the only criterion. This will be found more or less opaque, with a distinct cloud. Its odor strong, fetid, and like that of stale fish, and is due simply to the presence of bacteria. The principal microbe most commonly found is the bacteria coli communis, but streptococci and bacillus subtilis are also frequently found.

TREATMENT.—This consists in irrigations of the bladder

and instillations of weak silver solutions into the deep urethra. Internally urotropin may be given, so as to combat the infection and prevent urinary decomposition.

Hæmaturia.—Presence of blood in the urine in any quantity is always most significant of lesions or abnormalities in some part of the urinary apparatus. The urine may be simply tinged from the presence of a very small amount and in other cases the quantity may be so marked as to give it a deep red color when freshly voided. The blood may be present in solution or clots and depends largely on the source of the hemorrhage. The microscope will differentiate between the hæmaturia and hæmoglobinuria; also from the presence of bile pigments or from the action of drugs, e. g. rhubarb, and senna. The origin of hæmaturia may be deduced with a practical knowledge of a few facts, which are summarized as follows: Oozing of blood from the meatus; or if in the two glass test, the first urine is bloody the hemorrhage is from the anterior urethra, the cause of which can be definitely determined by the endoscope.

When the first and second glasses both contain blood with the history of increased micturition, tenesmus, pain and terminal hæmaturia, or blood at the end of urination, the bleeding is from the deep urethra, prostate, seminal vesicles or neck of the bladder. This calls for the use of the endoscope, cystoscope, stone searcher and a rectal examination so as to definitely localize the morbid area.

Hemorrhage from the ureter or kidney is usually indicated by long thin clots noted in the urine in both glasses. With this there will be the usual history of frequent attacks of renal colic, and shooting lumbar pains. The lumbar region and abdomen are sensitive to manipulation, the overlying muscles being tense and resistant.

Bleeding from the bladder, ureters or kidneys may be determined by the use of an irrigating cystoscope. If the bladder is the source of the hemorrhage it can be readily seen. If the kidneys or ureters are the seat of the lesion the blood will be seen on its entrance to the bladder.

Sometimes even these methods fail to localize the source, when it may become necessary to resort to what is known as the RESORPTION test, which is based upon the following principles. The mucous membrane normally has no power of absorption, therefore, when the bladder is irrigated and thoroughly drained, and filled with a 2 per cent. solution of potassium iodide.

In from 15 to 20 minutes later, if the patient's sputum is added to a starch solution, the presence of iodine will be indicated if it is absorbed by the diseased area in the bladder, by a blue reaction.

History of traumatism in the perineum, e. g. kicks, etc., indicate contusion, laceration, and sometimes rupture of the urethra.

TREATMENT.—The patient should be kept quiet as possible, and fluid ext. of ergot or adrenalin chloride (1-1000), in 15 drop doses, given by the mouth every third hour until the bleeding is controlled. If there be much pain and distress morphia may be given. The source of the bleeding should then be determined. The treatment of each of the various affections in which hæmaturia may occur as a symptom will be considered more in detail in their respective chapters.

HEMORRHAGE FROM THE URETHRA.

Hemorrhages from the urethra are produced in various ways. The causes may be mechanical or from pathological conditions. The mechanical causes are from the introduction

of an over sized bougie, improper or forced passage of any instrument and by calculi or any foreign bodies lodged in the urethra, severe chordee may also give rise to bleeding from the urethra. It may occur from general arterial excitement. The pathological conditions causing hemorrhages from the urethra itself are: Erosion of a blood-vessel in chronic ulcerations, papilloma, stricture.

TREATMENT.—The recumbent posture, application of cold and pressure, should be tried. A small flat piece of cork should be pressed by the patient against the perineum and gradually brought forward until it lights on the point of bleeding and the dripping of blood will cease. A solution of adrenalin chloride 1:1000 may be used as an injection. Gallic or tannic acid may also be of service. A steel bougie first put in very hot water and then introduced into the urethra is often used to arrest this variety of hemorrhage. If the hemorrhage is from the anterior portion of the urethra, insert a catheter, and apply a bandage firmly around the penis.

FUNCTIONAL DISORDERS—STERILITY.

Either by reason of some mechanical defect in the seminal tract, or some alteration in the semen itself, the individual is devoid of the power to fecundate the ovum of the female. In this condition the ability to copulate and the powers of ejaculation are however preserved. Impotence and sterility may coexist.

Pederson classifies sterility into three varieties:—

1. AZOÖSPERMIA—where the spermatozoa are absent.
2. ASPERMIA—in which there is an absence of seminal fluid.
3. MALEMISSION—or improper lodgment of the ejacu-

lated seminal secretion within the vagina owing to some deformity of the penis.

Finger recognizes four types of pathological changes in the semen which may cause sterility; viz.:—

1. Azoöspemia—defined in the foregoing paragraph (q.v.).
2. Oligozoöspemia—or diminution of spermatozoa.
3. Necrospemia—in which the spermatozoa are motionless and without life.
4. Aspermia—absolute and temporary—classified in the foregoing paragraph.

Semen normally consists of the secretions of the seminal vesicles, prostate, Cowper's glands, Littre's glands and the spermatozoa. Azoöspemia is only recognized by the use of the microscope. This condition exists normally before the age of puberty but in adolescence is due to pathological changes, e. g. frequent nocturnal emissions due to a prolonged habit of masturbation, excessive sexual indulgence in which cases the absence or diminution of the spermatozoa is only temporary and reappears after the lapse of a few days from intercourse.

SPERMATORRHŒA.

Strictly defined, the term spermatorrhœa implies a condition in which there is a discharge of material containing the spermatozoa. (Fig. 1.) This often occurs in individuals of the neurasthenic type, in whom there is a history of masturbation or sexual excess. Conscious of their vicious habits and ignorant of the physiology of the sexual organs, they develop hypochondriasis. Their chief fear is that they might suffer the "loss of manhood." These patients present the usual constitutional disturbances, e. g. headache, constipation, loss of appetite, vague muscular pains and

general debility. They complain chiefly of some glary mucoid discharge appearing at the meatus after defecation, micturition or an erection, which is interpreted as semen. Sometimes the habit is acquired after an attack of urethritis, of passing the urine into a glass vessel and examining it. Their suspicion is aroused at the least presence of mucus, pus, threads, etc., as being seminal material. Spermatorrhœa is easily confounded with prostatorrhœa. Repeated microscopic examination of the urine is imperative before an accurate diagnosis of spermatorrhœa can be made.

The causes are practically the same as those of impotence (q.v.).

TREATMENT consists of sedatives, tonics, rest and general hygienic measures, abstinence from the use of alcohol and tobacco. Electricity and massage should also be tried.

NOCTURNAL EMISSIONS.

Involuntary emissions of seminal material during sleep, accompanied by a lascivious dream, frequently occur in vigorous adults. These emissions are attended with an erection and the ecstasy of sexual excitement. Sometimes the patient may have the emissions altogether unconsciously, without the least recollection on awakening. When they occur no oftener than once in ten days it is said to be harmless to the health of the individual. The cases of nocturnal emissions are most often met with in patients of the anæmic and neurotic type where there is more or less nervous exhaustion from one cause or other.

TREATMENT.—The patient should be assured that the condition is nothing abnormal and the physiology of the parts briefly explained. The treatment for impotence (q.v.) applies with equal force to nocturnal emissions.

SEXUAL IMPOTENCE.

Broadly speaking, impotence may be said to be a condition in which there is a partial or complete inability to perform the sexual act. For clinical consideration and the convenience of description, Gross classified it into four types: (a) ATONIC, (b) PSYCHICAL, (c) SYMPTOMATIC, (d) ORGANIC.

Atonic impotence is by far the most common variety and is defined as a form in which there is a loss of the power of erection to a greater or less degree, without a deficiency in ejaculation. In fact the ejaculatory function is increased. Sexual desire is present but usually the erection lasts but for a moment, and is attended with a premature ejaculation.

Causes.—Subacute and chronic inflammation of the deep urethra, hyperæsthæsia of the urethra, prolonged and excessive masturbation and excessive sexual indulgence.

SYMPTOMS.—In addition to the sexual weakness complained of by the patient, he will present a history of frequent nocturnal emissions, insomnia, or restlessness, anorexia, headache, vertigo, malaise, evidence of neurasthenia, melancholy and some mental aberrations may also be noted.

DIAGNOSIS.—Examination of the urethra with the bougie will reveal its hyperæsthetic condition. With the endoscope may be seen the hyperæmic condition of the mucous membrane. Examination of the prostate and vesicles by the rectum will disclose tenderness and abnormalities of the prostate from chronic inflammation.

PROGNOSIS.—In the youthful and robust where the causative factor has been ascertained it is favorable. When the etiology is obscure and the patient debilitated and neurasthenic, it is extremely difficult to obtain favorable results.

TREATMENT.—The treatment should resolve itself into local and constitutional measures. Guided by the causative

factor and the physical condition of the patient, the treatment is governed accordingly. The cause must be ascertained by careful digital examination per rectum of the prostate and seminal vesicles. The penis, urethra, and bladder should also be examined. Any abnormalities thus found must be treated. Pathological changes in any of these structures may be the direct or indirect cause of impotence, therefore any hyperæmic or hyperæsthetic condition of the mucous membrane should be carefully noted. The best agent to overcome the hyperæmia and hyperæsthesia are: the cold sound (Beneque curve) or still better the psychrophore (Fig. 35.) and instillations of silver nitrate 2 to 5 grs. to the oz. The passage of a cold sound should be performed every third or fourth day, allowing it to remain in the urethra longer at each seance. As the hypersensitiveness is slowly reduced the size of the calibre may be gradually increased. If upon endoscopic examination, lesions, e. g. granular or congested patches and erosions are found in the urethra, applications of silver nitrate solution, (10 to 15 grs. to the oz.) made directly thereto are of great service. The prostate should also be



FIG. 35.—Psychrophore.

massaged once each week. This improves its muscular tone and often stimulates erection and the ejaculations become less premature.

CONSTITUTIONAL TREATMENT.—First, an attempt must be made to make a deep mental impression on the patient as to the prognosis and the importance of his co-operation. All forms of sexual excitement should be prohibited. This is imperative. He should avoid the company of women, and if married, he should sleep in another room. His mind must be kept occupied and exercise, e.g. walking, swimming to a moderate amount. The personal hygiene of the patient must likewise not be overlooked. As much life in the open air as possible is highly beneficial. Change of climate, frequent warm baths followed by a cold shower and brisk rubbing with a Turkish towel are also advised. He should have at least eight hours sleep daily and on a hard mattress, without too much cover. The diet should be wholesome and nutritious, and the use of alcohol and tobacco strongly interdicted, unless he be an habitue in which instance the amount must be reduced to a minimum. Attention to the bowels is essential and care taken to avoid constipation. Internally some nervous sedative, e.g. sodium or potassium bromide should be given.

The following formula is often of service:—

R

Tr. Belladonna.	℥ xxx
Liq. Potass.	℥ iv
Sodii Bromide.	℥ iv
Syr. zingiberus.	℥ ij
Aquae q.s. ad.	℥ vi
Sig.—Tablespoonful t. i. d.	

The bromides may also be combined with quinine, with which its therapeutic efficacy is said to be increased. When

the urethral mucous membrane is restored to its normal integrity and the impotence still persists, the genital centres in the brain and cord may remain in their exhausted condition.

For this purpose Pederson recommends:—

R

Quinine sulph.
 Ferri sulph. aa ℥ ij
 Zinci Phosphidi. grs. ij

R

Strych. Sulph. gr. $\frac{3}{4}$
 Fiat pil. xl
 Sig. Two t. i. d.

Electricity in the form of a galvanic current is also often of service especially when the symptoms are those of a depressed spinal or cerebral centre. The positive pole (anode) placed over the lumbar spine and the negative electrode (cathode) over the perineum and genitals. The current should be mild and continuous, lasting from 3 to 5 minutes and given every two or three days. Faradic current may also be used.

PSYCHICAL IMPOTENCE.

SYNONYMS.—*Imaginary* and *false impotence*.—This form of impotence is manifested by absent or incomplete erection with premature ejaculation and differs principally in its origin and is not so serious as the atonic variety. Psychological impotence results from some emotional disturbance, e. g. embarrassment or fear, or excitement attending the first coitus of a virtuous and newly married man. Other emotional factors are extreme joy, grief, fright, disgust, and suspicion. Neurasthenics, by reason of the slightest abnor-

mality of the genitals, are apt to become impotent. Apprehension over youthful excesses or masturbation are also contributing causes of this condition.

DIAGNOSIS.—A careful history and examination of the patient, including a careful exploration of the urethra must always be made so as to exclude the presence of lesions, which if found must be treated locally.

PROGNOSIS.—Usually favorable where the condition is truly psychical.

TREATMENT.—In this class of patients, positive assurance of the safety and nature of the sexual act, its hygiene, etc., is often all that is required. Where the patient presents evidences of hypochondriasis the treatment is more difficult. Temporary absence of coitus must be insisted upon. The other measures are practically the same as that given for atonic impotence, until a mental effect is obtained. Then assurances are in order.

SYMPTOMATIC IMPOTENCE.

This variety is often due to the prolonged use of drugs, also from lesions of the cerebral or spinal centres and in some forms of an acute or chronic exhaustive disease. The drugs which may produce a condition of impotence are alcohol, tobacco, opium or its alkaloids, chloral, bromides, arsenic, antimony and lead.

The acute diseases, sometimes constituting the etiology of this affection are, phthisis, diabetes, and Bright's disease.

PROGNOSIS.—When due to central nerve lesions, it is unfavorable, otherwise good when the cause is removed.

TREATMENT.—Should consist of vigorous tonics, hygienic living, withdrawal of the drug (if impotence is thus produced) and electricity.

ORGANIC IMPOTENCE.

The inability to copulate, due to some physical abnormality, whether congenital or acquired, constitutes the organic type. Elephantiasis of the penis, hypospadias, epispadias, tumors, varicose of the dorsal vein, etc., represent the most common of the causes. Certain lesions of the testicle resulting in sterility may secondarily give rise to impotence.

CHAPTER VI.

DISEASES OF THE SEMINAL VESICLES.

Acute seminal vesiculitis.—The seminal vesicles frequently become involved secondarily by extension through the ejaculatory ducts from a posterior urethritis, or its implication may be due to a gonorrhœal prostatitis. The anatomical relationship of the seminal vesicle to these structures is shown in the accompanying illustration.



FIG. 36.—Posterior view of the bladder. 1. Ureter. 2. Vas deferens. 3. Seminal vesicle. 4. Trigone. 5. Prostate. (After Holden.)

SYMPTOMS.—The symptoms are always more or less obscure but present mostly those of a posterior urethritis. In addition there is a throbbing pain, deep seated in the rectum, and tenderness in the suprapubic region. If the involvement is confined to the seminal vesicles, and the infection in the posterior urethra has been eradicated, the urine at first is

clear, but later, when the vesicles begin to empty themselves into the prostatic urethra, the contents of the bladder become contaminated and the effete material is found in the urine. Sometimes the discharge from the vesicles is dark brown or red in color from the admixture with blood, which may be either from the seminal vesicle itself or from the posterior urethra. The source must be definitely ascertained.

DIAGNOSIS.—This can only be made by a digital examination via the rectum. The vesicles will be found swollen, soft and boggy, sometimes fluctuating and extremely tender in the acute stage.

COMPLICATIONS.—Principally epididymitis, and though rarely peritonitis. Epididymitis occurs as the result of some of the gonococci finding their way through the vas deferens into the epididymis. Peritonitis is the result of the close anatomical relation which the perineum bears to the vesicles.

TREATMENT.—Patient should be given absolute rest by being put to bed and given a saline cathartic. Hot sitz baths and copious irrigation per rectum with hot or ice water affords relief by allaying the inflammation. If the symptoms of posterior urethritis are present, oil of sandalwood and a $\frac{1}{2}$ gr. opium suppository are useful in relieving the tenesmus and in rendering the urine bland.

Chronic seminal vesiculitis.—When the acute conditions do not yield to treatment as outlined above, the condition becomes chronic. Chronic seminal vesiculitis has been classified by Fuller in two varieties, (1) atonic vesiculitis, in which the muscular fibres of the walls of the vesicle become atonic, (2) inflammatory vesiculitis, in which the walls become thickened and indurated, either from simple gonorrhœa or tubercular origin.

Atonic vesiculitis is induced by non-resolution of an acute inflammation in the organ. It is in most cases caused by sexual excesses and the consequence of which the atonic condition of the muscular fibres is occasioned. By reason of the loss of tone the walls of the cavities become distended and the muscular fibres are unable to evacuate their secretion. The *expression urine* which is obtained by allowing the patient to urinate in one glass and then stripping the vesicles vigorously and allowing him to empty the remaining contents in a second glass which will contain the expressed seminal fluid. This appears in masses of gelatinous material about $\frac{1}{2}$ in. long, and about as thick as a straw. In addition to this flakes of inspissated semen are also found. Very often the vesicle thus affected becomes the seat of invasion from the bacillus coli of the rectum, giving rise to chronic inflammation with or without perivesiculitis.

Even where there are hyperplastic changes in the connective tissues surrounding the vesicles, the ejaculatory duct is not compressed and its function not impaired with, therefore, sterility does not result.

ETIOLOGY.—Principal cause is gonorrhœal infection but it may originate from sexual abuse and traumatism, also in individuals who are being catheterized and from chronic inflammatory changes, adjacent to the vesicles.

THE SYMPTOMS depend upon whether the posterior urethral infection coexists, in which case, tenesmus and frequent micturition are present. On straining at the act of defecation a viscid glary discharge seen at the meatus will be noticed which is sometimes called *prostatorrhœa*. The mental symptoms are depression, irritability, hypochondria and tendency to melancholia. The sexual function is more or less impaired. There are frequent nocturnal emissions and

premature ejaculations which are often clotted with blood, and sooner or later, impotence is established.

DIAGNOSIS.—The history will usually include some gonorrhœal infection, which the patient complains has never been entirely cured. The discharge from the meatus appears in exacerbated form on the least indiscretion. In the course of a few days this may subside only to appear again on the next indiscretion. The examination of the vesicles per rectum will reveal the true condition of affairs to one who is familiar with the normal touch of these parts. In making an examination, the bladder should be moderately distended with urine and the patient placed in the knee-chest position. The normal vesicles will feel soft and attended with little or no pain to the touch, whereas, in the atonic variety they are swollen, tense and very sensitive. Sometimes, especially where perivesiculitis exists, they are hard and indurated.

TREATMENT.—This should comprise massage of the vesicles every four or five days, or even once a week. The effects of the massage in emptying the vesicles of their inspissated material gives the muscular fibres of the walls a chance to regain their normal tonicity. The contraindications of stripping of the vesicles are the existence of an acute attack, blood in the seminal secretion or extreme sensitiveness. There is always more or less danger of epididymitis when these conditions are present. Infection of posterior urethra must be treated by instillation with a Keyes, Ultzmann or Guyon syringe. This local treatment of the urethra and the stripping of the vesicles should alternate one another and never be done at the same seance.

THE DURATION of treatment is usually from a couple of months to a year.

Tuberculous vesiculitis.—This lesion occurs secondarily

to a tubercular foci somewhere in the genito-urinary tract, and results in consequence of an extension, as for instance, from the epididymis by way of the vas deferens. Gonorrhœal infection is a frequent predisposing element. The vesicles are nodular and progresses slowly, but with a tendency to invade adjacent tissues. Sometimes with the formation of a perivesicular abscess, which results often in a fistulous opening in the rectum or perineum.

THE DIAGNOSIS.—This is based largely on the nodular character of the glands and its surrounding tissues. In these conditions the prostate is also involved.

TREATMENT.—This consists in hygienic measures such as out-door life and abundant nutritious diet, suitable climate, internally cod-liver oil and creosote are indicated. Radical treatment, e. g. extirpation, is not satisfactory. Should there be abscess formation it may be drained through a free incision in the perineum.

CHAPTER VII.

AFFECTIONS OF THE TESTIS AND ITS APPENDAGES AND COVERINGS.

The **scrotum** is a pouch of skin, in which the two testicles are normally lodged. It consists of two layers, *integument* and *dartos*, respectively. In the middle of the scrotum is the raphé and dividing the pouch there is a septum. The coverings of the testes, in addition to the integument and dartos, are the *intercolumbar* or *spermatic fascia*, derived from the pillars of the external abdominal ring. The *cremasteric*, coming from the internal oblique muscle, the *infundibuliform* fascia, and the *tunica vaginalis*, derived from the parietal layer of the peritoneum.

The **testis** is oval shape and is suspended obliquely in the scrotum by the *spermatic cord*. The left is usually lower than the right. On the posterior surface is the appendage known as the **epididymis**, which is a continuation of the convolution in the testicle. The upper or larger end is termed the *globus major*, while the lower or smaller end is referred to as the *globus minor*, the two being connected by the body. Intimately surrounding the testicles are two other coverings, known as the *tunica albuginea* and *tunica vasculosa*.

Histologically the testicle presents numerous lobules; each contain two or more seminiferous tubules, which if unraveled would measure 18 inches in length (Fig. 37). The testes re-

ceive their blood supply from the deep epigastric, superficial and deep external pudic and the internal pudic.

The **vas deferens** begins at the lower end of the globus minor of which it is a continuation. After passing along with the cord, through the inguinal canal it enters the abdomen through the internal ring where it curves around the side and lower part of the bladder and joins the ejaculatory duct, which empties itself into the prostatic urethra, running a course of about 2 feet.



FIG. 37.—Diagram of a vertical section through the testicle. 1. Mediastinum testis. 2-2. Trabeculae. 3. One of the lobules. 4-4. Vasa recta. 5. Globus major. 6. Globus minor of the epididymis. 7. Vas deferens. (After Holden.)

AFFECTIONS OF THE SCROTUM.

The scrotum may be the seat of **wounds** and **contusions**, the various **dermatoses** presenting no special symptoms nor requiring any particular treatment, other than when seen in other parts.

The other principal affections of the scrotum are: œdema, emphysema, sebaceous tumors, gangrene and elephantiasis. (See Fig. 38.) **œdema** of the scrotum is often associated with renal and cardiac affections and after a complete extirpation of inguinal glands. *Emphysema* is frequently found in cases of urinary extravasation into the scrotal tissues. **Gangrene** sometimes occurs as a result of injury or extravasation of urine. It may also occur spontaneously without a definite cause, in individuals of the alcoholic habit and in debilitated subjects suffering

with diabetes and Bright's disease. **Tumors** of the scrotum most often met with are: sebaceous cysts, lipoma, sarcoma, and epithelioma. The latter malignant growths usually arise secondarily to growths in adjacent structures.

Gangrene of the scrotum.—May be due to bac-

teria, to interference with the circulation, to heat or cold, and to injury of the trophic nerves. The symptoms vary according to the cause. The **PROGNOSIS** should be guarded as the mortality is 25 per cent. The testicles almost invariably retain their functions if the patient recovers. The most effective **TREATMENT** is *prophylactic*. Interference with free flow of the urine must be corrected, wounds asepticated, scrotal swellings incised, except when due to non-inflammatory oedema, in which case the underlying cause must be treated. Gangrenous tissue should be removed with strict



FIG. 38.—Elephantiasis of the Scrotum. (Native of Figi Islands.)

antisepsis, paying special attention to recesses in which pus might collect. The testicles will be covered by granulation tissue which will form a sufficiently useful scrotum, or a larger one may be formed by a plastic operation. Castration should never be done unless the testicles are gangren-

ous. Even when this is suspected it is better to wait until nature throws off the sloughing portions before sacrificing the entire testicle.

Hydrocele consists of a serous effusion into the cavity of the tunica vaginalis. Fig. 39. It may also occur in cysts of the testes and epididymitis in the spermatic cord in which instance it is termed *encysted hydrocele*.

VARIETIES.—HYDROCELE OF THE TUNICA VAGINALIS and

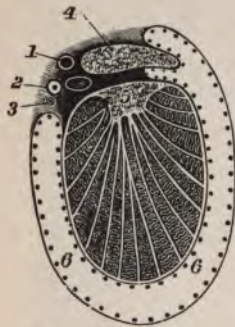


FIG. 39.—Transverse section through the left testicle. (The dots show the reflections of the tunica vaginalis.) 1. Spermatic artery. 2. Vas deferens. 3. Deferential artery. 4. Epididymis. 5. Mediastinum testis. 6-6. Cavity of the tunica vaginalis. (After Holden.)

HYDROCELE OF THE CORD. Either condition may be congenital or acquired. **Congenital hydrocele** occurs where there has been improper foetal development in which there is a communication of the tunica vaginalis testis with the peritoneal cavity owing to the failure in the obliteration of the opening. After the descent of the testicle from the abdominal cavity into the scrotum, owing to this defect there is an accumulation of serous fluid in the cavity of the tunica vaginalis, which distends the sac, this being much more noticeable when the patient is standing and walking.

DIAGNOSIS.—The scrotal tumor is seen in early life, will be found smooth, translucent, fluctuating and transparent and extends well toward the inguinal canal. It is dull on percussion in contradistinction to the resonance of hernia.

TREATMENT.—Pressure by means of a well fitting and firmly applied truss from the inguinal canal will usually effect a closure and soon be followed by absorption of the

effusion in the tunica of the vaginalis. If pressure fails to obliterate the funiculiform or vaginal process, the sac may be aspirated by multiple needle punctures and the pressure reapplied. If there be a coexisting hernia, a radical operation will cure both conditions; and therefore should be advised.

Acquired hydrocele of the tunica vaginalis testes.—

This variety of hydrocele is most frequently seen in adults and is usually unilateral, rarely both sides involved. The tumor is as a rule egg shaped, with its base at the bottom of the scrotum, its long axis directed toward the abdominal ring; it varies in size according to the amount of effusion. The scrotal tissues are more or less distended and upon palpation will be felt a firm elastic tumor and fluctuation. Hydrocele is not attended with any pain, except at the seat of the testicle.

Its onset is gradual and its progress insidious, often not being noticed by the patient until it assumes some proportions. The contained fluid is highly albuminous, usually clear and straw colored, it may however contain blood, thus altering the color.

DIAGNOSIS.—The recognition of hydrocele is as a rule not difficult. The principal conditions which may be confounded are principally hernia, syphilitic orchitis, sarcoma and chronic hæmatocle.

The characteristic pear or ovoid shaped growth with a history of slow growth beginning at the bottom of the scrotum and the translucency or "light test." The testis is usually found posteriorly and at the upper part of the tumor, if the condition be of long standing the thickness of the sac may give absolutely no translucency.

The differential points in the diagnosis of hydrocele and

hernia are as follows: in hydrocele there is no impulse on coughing. The position or size of the tumor is not altered with the patient standing or lying down; in hydrocele the tumor presents dulness on percussion, while in the hernia there is distinct resonance. In hernia the growth begins from above downward where it is largest and doughy, where in hydrocele the tumor begins from the bottom of the sac, grows upward and is usually firm in consistency.

ETIOLOGY.—Gonorrhœal epididymitis and epididymo-orchitis may give rise to chronic hydrocele. These affections, whether due to gonorrhœa or other causes, specific or malignant, may be accompanied by a chronic effusion in the tunica vaginalis, may also follow varicocele and may also



FIG. 40.—Hayden's aspirator and trocar.

occur as a complication of dropsy. Hydrocele is very frequently caused by traumatism.

TREATMENT of hydrocele may be either palliative or radical. The palliative method simply consists of temporary removal of the fluid by tapping, using for this purpose an ordinary medium sized aspirating needle or trocar. (Fig. 40.) The part having been rendered aseptic, the tumor is grasped by the left hand on its posterior surface and the skin drawn tense. The trocar is then made to enter at the junction of the lower and middle third of the tumor for a distance of about half an inch in depth. The fluid is then drawn off and the puncture closed over with a piece of sterilized gauze

or cotton, held in place with collodion. In most cases this procedure is attended with refilling of the sac within the course of a few months.

Treatment by means of *caustics* and *irritants*, intended to obliterate the sac is at the present day no longer resorted to. It is merely mentioned in order to condemn it.

Radical method of treatment.—Several operations have been devised in order to produce a radical cure; chief of which are Doyen's, Von Bergmann's and Volkmann's.

The **Doyen operation** consists of a complete inversion of the sac. The technic of the operation is as follows: The pubes are shaved, etc., the patient is etherized, the part scrubbed with soap and water, rinsed with alcohol and washed with a sublimate solution. Incision is made through the scrotal tissues over the convexity of the tumor by transfixion. The hydrocele sac is then exposed, separated from its adhesions and delivered from the scrotal cavity. An incision is made into the distended sac, the contents evacuated and the tunica vaginalis sufficiently incised to allow its complete inversion, and the edges held in apposition by a few catgut sutures. It is then replaced in the scrotum, with the result that the testicle lies outside of the tunica between it and the scrotal wall. The serous surface of the tunica vaginalis faces outward and soon becomes fused with its loose connective tissue. The wound is then flushed with warm saline solution and the wound of the scrotum closed with interrupted silk-worm sutures. This operation is rarely attended with any bleeding and good results almost invariably follow its performance.

VOLKMANN'S OPERATION consists of making a vertical incision about three inches in length over the middle of the tumor tissues, carefully dissecting down to the tunica vaginalis.

The hydrocele sac is then punctured, and a full incision made of the sac by means of a pair of blunt scissors. The edges of the tunica and the corresponding edges of the scrotum wound are then sutured. The hydrocele cavity is swabbed with pure carbolic acid and the drainage tube inserted, the parts brought together or the wound may be packed with iodoform gauze. This operation has been followed by recurrence of the hydrocele but in most cases it is followed by a radical cure.

THE VON BERGMANN OPERATION consists in resection of the sac, and has been found a satisfactory and successful method. After the patient has been etherized and the field of operation rendered aseptic, a vertical incision is made over the anterior surface of the hydrocele, the hydrocele is then liberated from any existing adhesions and delivered from the scrotal sac. A free incision is then made into it and the parietal layer of the tunica vaginalis is completely resected within a $\frac{1}{2}$ inch from the testes and epididymis. After the bleeding points have been thoroughly controlled the edges of the wound are brought into apposition and sutured.

Encysted hydrocele of the epididymis (or spermatocele) may accompany hydrocele of the tunica vaginalis, or may exist by itself. The testes may also be the seat of an encysted hydrocele. These cysts may be subserous and parenchymatous, or large and small. The subserous cysts are usually multiple (*multilocular*); are about the size of a pea, and are found around the upper part of the globus major. The contained fluid may be clear or milky. Cysts of the testicle itself are rare.

DIAGNOSIS.—Encysted hydrocele of the epididymis is usually diagnosed by its position, the number of cysts and the character of fluid contained which may be determined by the use of a hypodermic needle.

TREATMENT.—If the encysted hydrocele be small, tapping is usually all that is necessary. Larger cysts should be treated by radical operation.

Hydrocele of the spermatic cord.—This occurs in two forms, the *diffused* and *encysted*. The diffused form consists of a serous effusion into the loose connective tissue of the cord and may escape the notice of the patient until it attains considerable size. The spermatic cord will be felt to be much larger, resembling very much an omental hernia. It is usually pyramidal in shape, broader at the base than at the top and is attended with very little discomfort. Its chief distinguishing features from that of a hernia are: that the tumefaction is firmer and dull on percussion, with slight fluctuation. The impulse on coughing is also a characteristic, as in hydrocele of the cord there is but very little downward movement and the gurgling sensation is absent. Hydrocele may also be recognized by its translucency.

TREATMENT.—Consists principally of making small multiple punctures, through which the fluid is evacuated and subsequent pressure often producing a perfect cure. Sometimes an injection of tincture of iodine or carbolic acid may be tried. If the cysts be multilocular and the palliative method fails, one of the radical operations should be resorted to.

Strangulation of the testes and epididymis from torsion of the cord, fortunately very rarely occurs. The testicle which may be in the inguinal canal or scrotum, suddenly becomes swollen and painful. It is usually seen in young persons in whom there is some evidences of undescended testicles. The seat of the tumefaction depends entirely on the location of the testicles. Besides the swelling the part is red and œdematous. Torsion of the cord strongly resembles strangulation, hernia, and appendicitis in its symp-

tomatology. The direct and exciting cause is violent and sudden muscular strain or effort. Unless this state of affairs is immediately relieved, gangrene of the testes results.

TREATMENT.—If the testicle is in the scrotum, torsion of the cord may be relieved by taxis. Damage of the testicles such as a hemorrhagic infarct or gangrene demand prompt surgical intervention and extirpation of the destroyed testicle.

HÆMATOCELE.

Hæmatocele is an extravasation of blood into the tunica vaginalis, the testes, epididymis or cord or into all combined, and may be acute or chronic. It generally occurs as an immediate consequence of injury of the scrotum; sometimes it arises without any assignable cause. There is swelling of the part which comes immediately or soon after the receipt of the injury, it resembles hydrocele as regards shape. At first the tumor is soft and fluctuation may be detected, but when the blood coagulates it resembles in character a solid growth.

TREATMENT.—In a recent case the first indications are to arrest the flow of blood and relieve pain. The horizontal posture with testicles raised, is necessary; the iced bag and cold lotion must be applied and if the blood remains fluid for a long time, tapping may be performed. In chronic cases if there are signs of suppuration, a free incision should be made into the vaginal sac, and the cysts and the clot turned out. Then follows the usual treatment to promote healing by granulation.

Hæmatocele of the epididymis, testes and cord is very rare; it may be diffused or encysted. The principles of treatment are the same.

ATROPHY.

ATROPHY OF THE TESTES is an affection frequently seen. It has been ascribed to a great variety of causes chief of which are malposition or ectopia, and abnormal retention when seen in the young. Degenerative process of testicle may also occur in syphilis, gonorrhœa, hydrocele and hæmatocele and certain forms of hæmiplegia. Atrophy of the testes has been observed in cases where there has been a long continued use of certain drugs, e. g. bromide of potassium and belladonna.

TUBERCULOSIS.

The testicle is frequently the seat of tubercular infiltration, in consequence of which its function is destroyed. The epididymis is usually affected primarily and secondarily involves the body of the testicle. It may also occur from a tubercular deposit in one of the other genito-urinary organs, or as a result of a general tuberculosis invading the testicles by the blood carried to it, probably by the spermatic artery, or it may travel by way of the vas deferens, lodging the tubercle bacilli in the epididymis.

It is supposed by many that, when the prostate, bladder or adjacent structures are primarily involved, the lymphatics convey the infection. Hereditary tendencies undoubtedly predispose to tubercular disease of the testes from such local causes as traumatism, gonorrhœa, etc. The age at which this affection is most commonly found is from 15 to 50 years which is the period of functional activity.

The course may be slow or rapid. One or two small nodules (each about the size of a pea) in the head of the epididymis may occasion no trouble for years, when suddenly from some exciting cause perhaps, they may suddenly grow

larger, coalesce, undergo caseation and suppuration with abscess formation.

The seminal fluid is apt to be tinged with blood at this time. The scrotal tissues are of a deep red or bluish color with a number of fistulous openings. When only one of the testicles is attacked, the other usually sooner or later becomes involved.

The chronic type of tubercular disease of the testes is as a rule attended with little or no pain. The swelling slowly increases, is nodular in character. This process may go on for months or even for several years before it undergoes caseation, abscess formation and subsequent fistulæ. This affection may be solely confined to the epididymis or it may involve the testicle.

The presence of hydrocele is said to be found in one-third of the cases of tubercle of the testes. Evidences of involvement of the prostate and seminal vesicles may be ascertained by digital examination in the rectum. The vas deferens is almost invariably attacked in the tubercle invasion of the testes. It is more or less thickened, irregular and nodular, with loss of its spermatogenic function. If both testicles are infiltrated, complete sterility occurs.

PROGNOSIS.—Even under the most favorable influence, climatic or otherwise, tuberculosis of the testicle rarely becomes permanently cured without an operation.

TREATMENT.—Palliative measures, e.g. change of climate, drugs,—cod-liver oil, hypophosphates, creosote, etc., may be instituted if the condition is recognized early, but even then, in most cases, these only retard the degenerative processes which almost invariably occur from the least exciting cause.

Surgical measures are indicated where the patient cannot

afford to go away, and is poorly housed and nourished, in which instance there is no other alternative but an operation, so as to arrest the further progress of the disease. The indurated masses in the epididymis and testes should be curetted and packed with iodoform gauze and allowed to heal by granulation. All sinuses should be enlarged, curetted, and packed with iodoform gauze. Castration is necessary in advanced cases in which the ordinary measures have failed to arrest the invasion of the tubercle, and where there are numerous fistulæ and the body of the testicle involved, or where there is a purulent hydrocele.

CYSTIC SARCOMA.

This affection is comparatively rare and occurs in early life, i.e. between the ages of 30 and 40, and usually attacks but one testis, running its course to a fatal termination in from 1 to 2 years. The growth begins insidiously and is not attended with any pain. The tumor is hard and smooth and strongly resembles gumma of the testicle (excluded by antisiphilitic measures) and may or may not be complicated with hydrocele.

Treatment.—This condition imperatively demands prompt and complete removal of the affected testicle.

CARCINOMA.

This form of tumor of the testicle is observed about middle life and is usually of the soft or encephaloid type. The glands of the groin are indurated, the cord thickened, the growth hard and smooth, later undergoing softening, and perhaps adhering to the scrotal covering, and eventually sloughing of these tissues through which the tumor protrudes.

Treatment.—Complete extirpation of the testicle, *dividing*

the cord as far up as possible. The inguinal glands should also be removed, as well as the scrotal tissues of the affected side.

The other tumors of the testicle less frequently found are: enchondroma (cartilaginous) and dermoid cysts.

CASTRATION.

TECHNIC.—After taking due antiseptic precautions and etherizing the patient, proceed as follows:—a longitudinal incision is made over the anterior scrotal wall down to the glistening surface of the tunica vaginalis. The adhesions are now broken up and the entire mass is delivered from the scrotal sac. The tunica is then carefully opened, the cord stripped of its serous covering as high up as possible and ligated with heavy silk or catgut. The cord is then transfixed, ligating each half separately so as to prevent slipping. A final ligature is next tied completely around the cord and it is then cut. It is well then to pierce the stumps with a needle dipped in carbolic acid. The bleeding points should now be controlled, the parts wiped dry and the wound closed with interrupted silkworm sutures, or the dependent portion left open for drainage where this is deemed advisable. If the tunica and scrotal tissues are also involved in the infective process, the first incision should extend from the external ring all the way down to the bottom of the scrotum so as to remove all the diseased areas. The operation otherwise is then performed as just described.

Surgical treatment of undescended testis.—Operation is justifiable when we consider that (1) a potential if not an actual hernia is always present; (2) that strangulation and torsion of the spermatic cord are strongly predisposed to by this condition; (3) that an inguinal testis is peculiarly liable

to trauma from external violence and from muscular exertion; (4) that imperfectly descended testes appear to be affected by malignant neoplasms oftener than when in their normal habitat in the scrotum; (5) that psychic disturbances may arise later; (6) that even should operation fail to lead to further development of the gland it will usually do no harm by way of disturbance of function, for it has been shown that practically all misplaced testes lack the spermatogenic function. The most favorable age for operation is from 5 to 12 years. **Orchidopexy** or fixing the testis in the scrotum is the operation of choice. Removal of one testis is rarely justifiable and castration never unless the gravest complications demand it.

VARICOCELE.

Varicocele consists of a varicose condition of the spermatic veins (pampiniform plexus) and is much more frequently met with on the left side than the right. It is more often found in adolescents, up to about the 30th year.

ETIOLOGY.—The occurrence of varicocele on the left side is accounted for by the fact that the left spermatic vein enters the inferior vena cava indirectly through the left renal vein, whereas on the right side the spermatic vein enters directly into the inferior vena cava; consequently the blood pressure on the left side is greater than on the right. It is further claimed that the sigmoid flexure immediately overlies the vein and when it becomes distended with fecal accumulations there is more or less compression.

SYMPTOMS.—On inspection the testicle on the affected side will be found to hang lower than normal; in its appearance and to the touch it resembles a bundle of earth worms. When the patient lies down, the tumefaction disappears.

resembling in this respect an inguinal hernia. The subjective symptoms are as follows: The patient complains of a sensation of weight and tension in the scrotum. The pain sometimes associated with these conditions, radiating up along the spermatic cord to the groin or to the loins and sometimes toward the kidneys, may be dull and sharp in character and aggravated by exercise or prolonged sexual excitement. Atrophy of the testicle due to impeded return circulation, is often the sequel of varicocele. Hydrocele is another not uncommon complication.

DIAGNOSIS.—Recognition of varicocele is never difficult; palpation and inspection of the worm-like mass are usually all that is required. Examination may be supplemented by compressing upon the abdominal ring; the patient being in the erect posture. The veins will be felt to be empty, but upon withdrawing the pressure the veins are again suddenly filled up which can be readily felt, thereby distinguishing it from a hernia.

TREATMENT.—The treatment of varicocele may be either palliative or radical. The palliative treatment consists of local support by means of a well fitting suspensory bandage, or alternate hot and cold douches may be given the patient with much relief. He should be instructed to empty his bowels regularly, avoid exercise or sexual excitement. The most satisfactory method of dealing with the conditions is by radical measures. Probably the best operation for varicocele is the open one, the advantages of which are obvious.

The open operation.—This may be performed under local or general anæsthetics. The parts having been prepared, the surgeon seeks the raphé of the scrotum, the tissues are drawn *tense* and he makes a longitudinal incision for half an inch

midway, between it and the external border of the scrotal sac, directly over the veins, being extremely careful to avoid any injury to the vas deferens which lies under the veins, and is perceptible to the fingers as a firm cord-like structure.

The covers of the cord are then carefully dissected until the sheath of the veins is reached, which is recognized by its shiny, light grayish color, overlying the blue veins now brought into view. The plexus is now separated from the tissues by the fingers, and strong ligatures of silk or cat-gut, are applied, first tying it below and then for a distance of about $1\frac{1}{2}$ to 2 inches apart, tying it above and leaving the ends of the ligature material long. The veins are then severed between the ligatures, thus excising about two-thirds of the plexus, leaving one-third to continue its function. The cut ends of the vein stumps are then brought together, the ends of the ligature tied and cut off short. In bringing the stumps together, it is well to reinforce the union by one or two sutures into the overlying sheath and veins.

Another method brought recently into vogue is the so-called HIGH OPERATION, which is as follows: An incision is made for a distance of about 2 inches directly over the inguinal canal, and the plexus of veins is brought up into the wound by the surgeon's finger through the inguinal ring and the distended veins are readily brought into view. The succeeding steps are the same as the ordinary open operation just described.

The method of SUBCUTANEOUS LIGATION of the veins is now rarely resorted to owing to the danger of puncturing the veins, with resultant hæmatocele. The encysted ligations are very apt to be the cause of persistent neuralgia and relapses of the varicocele are very frequent.

CHAPTER VIII.

AFFECTIONS OF THE PROSTATE GLAND.

The prostate, which is an accessory sexual organ, is about the size and shape of a horse-chestnut and is intimately connected with the bladder and urethra. It is readily accessible to touch by way of the rectum, by which its upper surface can be distinctly felt. It consists of a mucous membrane, longitudinal and deep circular fibres, which contain the glandular substance, the whole being invested by a firm dense capsule of fibrous tissue. Its weight is approximately 4 to 6 drams. It surrounds the vesical end of the urethra, immediately in front of the bladder, and consists of two lateral lobes. The gland is pierced by the urethra, which segment is referred to as the prostatic portion. The ejaculatory ducts enter the gland and open into the urethra on each side of the sinus pocularis. There is a median portion connecting the two lateral lobes which have been erroneously described as the third lobe, which when it exists prominently is considered abnormal. A prolongation of the deep perineal fascia encloses the gland. The blood supply is through the vesico-prostatic artery, a branch of the inferior vesical, also from the internal pubic and middle hemorrhoidal branches. The veins of the prostate are known as the prostatic plexus. The nervous supply is derived from the sacral sympathetic, and from the 10th,

11th and 12th dorsal, the 1st and 2nd sacral and the 5th lumbar.

Acute Prostatitis.—Inflammation of the prostate is always a serious condition when it occurs as a complication of urethritis. It may develop at any time during the attack of gonorrhœa, but usually occurs at the terminal stage. Epididymitis may precede or co-exist with the infection of the prostate. It is claimed by some that this affection occurs in 70 per cent. of all cases of posterior urethritis.

VARIETIES.—The two forms of prostatic inflammation are the *follicular* and *parenchymatous* varieties. In the follicular form, small multiple abscesses are likely to develop as a result of the follicular suppuration. In acute parenchymatous prostatitis, the whole glandular structure is involved and unless resolution occurs it frequently results in the formation of a large abscess.

ETIOLOGY.—The causes are *predisposing* and *exciting*. The predisposing factors are tuberculosis and gonorrhœa. The exciting causes are always more or less uncertain. The chief causes to which infection of the prostate has been attributed, are strong injections and irrigations, sexual indulgence and ungratified sexual excitement during an attack of urethritis.

SYMPTOMS.—The symptoms as a rule are marked. The patient's first complaint is of a sense of fullness with possibly slight pain in the rectum. The pain soon becomes bearing down and throbbing in character. With this there may be certain febrile disturbances and sometimes retention of urine. Under proper treatment, resolution should take place in from 3 to 4 weeks.

TREATMENT.—The patient should be advised to rest in bed, the bowels kept regular by saline laxative, or *castor*

enema and he should be given internally salol or urotropin. Locally the treatment consists of hot or cold rectal irrigations about 3 times daily, followed by the insertion of an opium and belladonna or ichthyol suppository. After the acute inflammatory symptoms have begun to subside, which will be at the end of about 10 days, massage of the prostate is then effective in hastening resolution, but must always be gentle, otherwise there is danger of inducing epididymitis. The most benefit is obtained from massage when carried out properly. The patient must be told to pass his urine in 2 glasses. The urethra and bladder are then irrigated with a mild antiseptic solution, and a few drams allowed to remain in the bladder. The patient is then put in the knee-chest position on the table or simply leaning over a chair while each lobe of the prostate is being stripped with the forefinger (well greased) of the surgeon. The solution in the bladder is then passed by the patient which irrigates the posterior urethra from behind forwards. This treatment should be carried out every 4 to 5 days for about six weeks. The application of cold is also very beneficial in these cases. The Kemp prostatic cooler is an exceedingly useful apparatus for this purpose. It is arranged in such a manner so as to allow a constant flow of cold water about the gland by means of an intake and outflow tube. Heat may also be applied in this manner.

Abscess of the Prostate.—Frequently, multiple small abscesses or a large single abscess of the prostate occur. Rectal examination under such circumstances presents the usual symptoms of abscess, e. g. swelling, heat and fluctuation, and tenderness over the prostate gland.

DIAGNOSIS.—Digital rectal examination is essential in making a positive diagnosis. The abscess will be found

large and somewhat soft, feverish and tender to the touch. A large fluctuating tumor will be detected where the prostate would be normally found.

TREATMENT.—In dealing with an abscess of the prostate, surgical intervention is imperative. A small incision is made in the perineum, with the cutting edge of the bistoury turned upward toward the apex of the prostate. The abscess cavity is now readily opened, pus evacuated, the wound flushed with bichloride solution and the cavity packed with iodoform gauze. If the pus is deep seated the body of the prostate must be reached by blunt dissection and treated in the manner just described. Unless the abscess cavity is drained, spontaneous rupture, resulting in fistulæ will in most instances occur. The abscess rupture into the urethra in a majority of cases and may also burrow into the rectum which is the next most favorable outlet. In a small percentage of cases the perineum may be the seat of the rupture. In cases of spontaneous rupture the subsequent treatment consists of prostatic massage and irrigations, of preferably silver nitrate solutions. Pyæmia has been known to result from abscess of the prostate.

Chronic prostatitis usually originates as a result of an acute inflammation of the prostate, particularly of the follicular type, but may also be the termination of a posterior urethritis. Pathologically the organ will be swollen and soft. The ducts of the gland are always large and patulous and the crypts and follicles often contain pus.

SYMPTOMS.—The symptoms of chronic prostatitis are largely those of chronic posterior urethritis. The passage of the urine may be attended with scalding and there is partial or complete impotence. With this phenomena the patient presents more or less neurotic symptoms, feels de-

pressed over his condition, there is loss of sleep, perhaps mental irritability, and loss in weight. Sufferers are often referred to as sexual neurasthenics.

Prostatorrhœa is defined as a condition characterized by more or less involuntary discharge from the gland, in the effort to rid itself of the over secreted material. This secretion may flow from the urethra after stool and urination or may be voided with the urine, and sometimes even after an erection. The escaping fluid is sticky and glary in character and is due to muscular pressure upon the prostate, emptying the prostatic crypts or follicles. Upon examination of the urine by the three-glass test, most of the discharge will be found in the third glass, while the first and second will be usually perfectly clear. Microscopically this secretion will be found to contain pus-cells, epithelium, mucus, sometimes granular phosphates, and phosphatic concretions. In making a **DIAGNOSIS** of prostatorrhœa it is well in many cases to massage the prostate before the urine is voided in the third glass, thus expressing the secretion for microscopic examination. A careful examination of the urethra and the seminal vesicles is essential in forming a correct diagnosis of the prostate itself being the seat of chronic inflammation.

PROGNOSIS.—When the condition is uncomplicated and in young individuals of moderate and temperate habits the prognosis, under proper treatment, is always favorable.

TREATMENT OF CHRONIC PROSTATITIS.—The average case of chronic prostatitis requires the same treatment as that of an ordinary chronic posterior urethritis. It is important that the patient lead a quiet life and abstain from alcoholic and sexual excitement. Highly seasoned foods should not be taken, the bowels evacuated at least once daily and vio-

lent exercise forbidden. The patient should be assured that his condition can be cured, that he will not become impotent. The local treatment consists of instillations of nitrate of silver solution or sulphate of copper (1 to 500) into the deep urethra by means of a soft rubber catheter or Keyes-Ultzman syringe. Rectal irrigations with either hot or cold water or a sitz bath are often beneficial. The use of a psychrophore which allows a constant flow of cold water, is also effective, a cold sound may also be used in the place of a psychrophore with the same results. Massage of the prostate through the rectum is one of the most useful means of inducing resolution and promoting absorption of the contained exudate. After the patient has urinated, instillation of a few ounces of a weak silver solution (1 to 3000) into the bladder should be given and then by massage of the gland, the crypts and follicles are emptied and the patient passes the solution contained in the bladder, thus flushing the prostatic urethra of the expressed secretions. After all the inflammatory symptoms have subsided the use of the Benique sound (Fig. 41) is valuable because of its peculiar double curve which exercises a certain amount of compression upon the gland and aids in promoting absorption.



FIG. 41.—BENIQUE'S
DOUBLE CURVE
BOUGE.

PROSTATIC HYPERTROPHY.

Enlargement of the prostate gland known as hypertrophy, commonly occurs in men of advancing years. The increase in the size of the gland frequently assumes enormous proportions, thus interfering with the function of the bladder, and with the act of micturition and consequently gives rise to various disturbances. The principal lesion is said to be inflammatory in character, of long standing and involving the glandular structure. In these cases the fibromuscular stroma undergoes secondary changes, adding still further to the enlargement.

Etiology.—The cause has always been the subject of much discussion. At best the etiology is based largely upon hypotheses. Some authorities attribute it to venereal irritation, while others ascribe it to such conditions as gonorrhœa, syphilis, calculus, and stricture.

Ciechanowski in 1896 stated that the changes in the stroma were due to a connective tissue proliferative process. Some believe that the original infection is gonorrhœal, the secretion of which is accumulated in the narrowed excretory duct. In other words the condition is essentially a chronic inflammatory process or prostatitis. This observation has been confirmed by such authorities as Finger and Keyes.

Pathology.—It is maintained by some, however, that the principal lesion is fibromyomatous in character, while others claim that the essential process is distinctly glandular. In the latter instance the enlargement is mostly found in the triangular shaped posterior median space (sometimes called the middle or third lobe) but may involve the lateral lobes as well. The gland being covered by a firm fibrous capsule the organs often preserve a smooth, round or oval shape. (Fig. 42.) These growths may predominate in the glandular substance

or upon the surface. In the latter instance they project toward the urethra or bladder.

For clinical considerations the subject of hypertrophy of the prostate may be summed up into the following pathologi-



FIG. 42.—View of the undersurface of an enlarged Prostate—measuring 7x6. 5x6 cm. and weighing 145 grammes. A catheter has been introduced through the urethra. (Deaver.)

cal conditions: hypertrophy of one or both lobes only, hypertrophy of the median portion itself, hypertrophy of the lateral lobes with bar formation, hypertrophy of the lateral lobes

and median portion in the shape of a sessile or pedunculated tumor of the middle lobe.

Changes in the urethra.—In consequence of an enlargement of the prostate, there is produced more or less structural change in the deep urethra: (a) the mucous membrane



FIG. 43.—Overgrowth of suburethral portion of Prostate, changing sub-pubic curve of urethra (after Anger). (Deaver.)

becomes thickened, (b) the urethra is elongated, (c) the normal curve is changed (Fig. 43), (d) the lumen of the canal is narrowed and its course irregular, (e) the dilatability of the prostate urethra is lost and the functions of the vesical sphincter impaired.

As a result of these changes, the function of the bladder is more or less interfered with, some of the same urine passes into the prostatic urethra, while the rest lodges in the post-trigonal pouch, which the bladder is unable to evacuate, and therefore becomes *residual urine*. This pouch formation soon results in structural changes in the bladder itself, the muscular fibres become much hypertrophied so that its carrying capacity is much decreased. In many cases this condition may be further complicated by ulceration of the tissues overlying the enlarged gland.

Symptoms.—The disturbances to which prostatic hypertrophy may give rise depend upon the seat of the enlargement and the changes in the prostatic urethra. In many instances the symptoms are not very marked, until the hypertrophy is well developed. On the other hand the symptoms may develop quite rapidly. One of the first symptoms of which the patient will complain is *difficulty in urination*, which may be either described as a *hesitancy* or difficulty in starting the flow, or an *increased frequency* especially during the night. As the condition progresses, diurnal frequency also occurs. Later it is noticed that the *size and force of the stream is decreased*, with more or less *dribbling* at the end of the act. The severity of this symptom varies according to the condition of the mucous membrane of the bladder, the amount of residual urine and the degree of stenosis.

As a result of the *residual urine* which soon undergoes decomposition, the bladder and prostatic urethra are likely to become much inflamed, irritable and painful, with a relative increased desire to urinate. The urine is loaded with pus and mucus which is very offensive or *ammoniacal* and *alkaline* in reaction. Trabeculations sometimes form, and may contain deposits of phosphatic concretions or

calculi. In these advanced conditions the infective process may ascend up the ureters and involve the kidneys, causing pyelitis, pyonephrosis, etc. The constitutional symptoms which may be complained of by such patients are: more or less *pain* in the testis and scrotum, glans penis, perineum, bladder and rectum. *Hæmaturia* may also be observed particularly after the passage of instruments or at the end of the act of micturition. It is usually traceable to some ulcerative process.

Complications.—RETENTION OF URINE is not an uncommon complication of prostatic hypertrophy and occurs either as a result of congestion or spasm. The exciting causes are, exposure to cold and dampness, alcoholic or sexual excesses, constipation or operations about the perineum and genital organs. It may likewise result from an impacted calculus lodged near the vesical outlet.

Dribbling of urine, which is seen in many cases, is merely the *overflow of retention* and when a catheter is passed into the bladder it will be found to contain considerable residuum. The presence of hemorrhoids is not uncommon, thus complicating the already troublesome symptoms. In severe cases hernia or prolapse of the rectum may result in violent straining in an effort to empty the bladder. Among the other complications which frequently occur are epididymitis and orchitis. A condition known as *catheter fever*, and may be caused by the injudicious use of instruments causing more or less traumatism to the bladder or urethra. This is marked by chills, malaise, and febrile disturbances, but is usually of short duration. In some cases during the course of prostatic hypertrophy, the patient suffers from violent tenesmus which may be constant. The few drops of urine which he is able to void are scalding and as the severity of the lesion pro-

gresses, health declines, he suffers from headaches, insomnia, nervous irritability and dyspepsia. Sooner or later he develops urinary poisoning as a result of complicated kidney lesions and uræmia. His breath has a peculiar urine like odor, his tongue is dry and coated, and unless surgical measures are resorted to, death ensues.

Diagnosis.—There should be no difficulty in making a diagnosis of prostatic hypertrophy after a careful examination and noting the patients' symptoms. In obtaining a history the symptoms already detailed, when present in a patient over 50 years of age, should always suggest enlargement of the prostate gland. This suspicion should be confirmed however by *urinary, urethral, bladder and rectal examination*. *Digital examination of the prostate by way of the rectum* is always very important, in order to ascertain its size and consistency and to determine whether the growth is fibrous or glandular in character. He should be allowed to void his urine while standing, observing the hesitancy, the parabolism of the stream, dribbling, etc. The catheter is now introduced into the urethra and the remaining urine withdrawn, the exact quantity measured and then careful urinalysis made, to ascertain whether there are any urethral, bladder or renal complications. When the bladder is empty, while the catheter is still in situ, it is good practise to irrigate with a warm saturated boric acid solution. The length of the urethra may be determined by measuring the distance in which it is necessary to introduce the catheter, before the urine begins to flow. Alteration in its length is significant of changes in the prostatic urethra. If possible a CYSTOSCOPIC EXAMINATION should be made so as to see whether the middle or lateral lobe projects towards the urethra and impinges upon the vesical outlet. The

diagnostic measures already alluded to should be supplemented by an examination of the urethra for stricture and of the bladder for the presence of a stone. This examination should always be conducted with the utmost gentleness, using a soft bougie a-boule, olivary bougies, coude (Fig. 44)

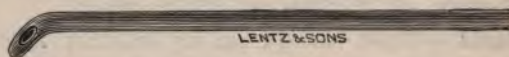


FIG. 44.—COUDE CATHETER.

or bi-coude (Fig. 45) catheter and the ordinary stone staff. The sensitiveness of the mucous membrane and the course and calibre of the prostatic urethra, may thus be determined and any bar obstruction or prostatic projection at the vesical neck, or the presence of stones can usually be recognized.



FIG. 45.—BI-COUDE CATHETER.

The condition of the bladder walls can also be ascertained by such procedure.

Treatment.—The treatment for relief of hypertrophy of the prostate is either *palliative* or *operative*, the application of which depends upon the circumstance of the case. Palliative measures consist in the use of instruments to “maintain the patulency of the prostatic urethra,” by means of a full size steel or flexible rubber bougie and the systematic use of a catheter. Patients should be instructed to lead moderate lives and to eschew the use of alcoholic or malt liquors. Constipation should be guarded against, and they must be careful not to expose themselves to cold or wet. The urine should always be passed immediately when there

is any desire, but if possible at regular intervals of 2 or 3 hours apart. They should partake freely of bland waters; coffee should be allowed but once a day, and highly seasoned foods or condiments should be avoided. Internally they may be given urotropin, boric acid or salol, to prevent urinary decomposition. If the urine is excessively alkaline, give dilute nitro-hydrochloric or soda bicarbonate, etc. Tonics, e. g. iron, quinine, and strychnine are indicated where there is general debility. If there is much pain and tenesmus, small doses of opium, morphine and belladonna may be prescribed by the mouth or rectum. Prostatic massage can be resorted to in some cases, but is contraindicated where there is much pus in the urine or congestion of the prostate. This is often much benefited by hot rectal irrigations or by the sitz bath.

CATHETER LIFE consists in daily and regular evacuations of the bladder, by means of a catheter, carried out by the patient himself. The catheter which he is taught to use for this purpose is of soft rubber and he should be impressed with the importance, of the proper care and preparation of the catheter, necessary to obtain good results. This may be conveniently carried about in a small case. (Fig. 46.) A small soft rubber instrument passed once every 24 hours is usually sufficient. When the bladder is empty it may be irrigated and instilled with 2⁵ to 4 drams of nitrate of silver solution (1 to 4000.) If the patient is disturbed very often at night a catheter may be passed and retained, and attached to a soft rubber tube which empties into a receptacle at the side of the bed.

Operative treatment.—When palliative treatment ceases to be of benefit or give the patient any relief, and the symptoms of the disease become more marked, operation is justifi-

fiable. It should only be resorted to where there is an increased amount of obstruction; when the passage of the catheter is accompanied by much pain or hemorrhage, and in cases where there is complete retention, also in severe cystitis and conditions in which the amount of residual urine is increasing. A gland palpable by the rectum, and rising



FIG. 46.—Aseptic pocket case for catheter. Natural size.

not far from the sphincter muscle, can best be attacked from below, but when higher up and projecting into the bladder, it should be operated on from above. When the enlargement is soft and composed of small lobes, operate from below. If the condition is complicated by the presence of a large calculus, work from above. The preservation

of sexual power is important, therefore, injury to the ejaculatory ducts should be avoided if possible. The following operations each have their special indications and are as follows:

Perineal prostatotomy is a more or less blind operation, as the surgeon must work through a small wound. The patient is placed in the lithotomy position, a tunnelled sound is passed and steadied by an assistant who at the same time also holds the scrotum out of the way. The urethra is now opened at the apex of the prostate over the convexity of the instrument. The surgeon then dilates the prostatic urethra with his forefinger, and any obstruction that is met is incised by a blunt bistoury, and a soft rubber perineal tube or large catheter inserted for drainage. The danger of hemorrhage is always imminent in this operation. It—the operation—is especially indicated where the growth projects towards the prostatic urethra and obstructs the vesical orifice.

Urethral prostatotomy is rarely performed of late years. It simply consists of dividing the obstruction in the prostatic urethra, with the prostatome passed by the way of the urethra.

The choice of methods of operating upon hypertrophied prostate, depends largely upon the judgment of the surgeon. The 3 principal methods are the perineal and suprapubic prostatectomy and galvanocaustic prostatotomy (Bottini's), which is an intra-vesicle operation, each of which hold a distinct place in prostatic surgery.

Perineal prostatectomy consists of a partial or complete extirpation of the gland through a perineal incision. This operation as modified by Alexander, consists of making a small suprapubic incision. The patient is then placed in the lithotomy position, a tunnelled sound passed and the

urethra opened on the convexity of the instrument, the sound is then withdrawn and the gland pressed down in the perineal wound, through the suprapubic opening. The capsule of the prostate is opened at its apex and the gland enucleated, first removing each of the lateral lobes and the median portion. The bladder is then drained above and below through both incisions. This operation may be done without the suprapubic cystotomy by which good results are often obtained. H. H. Young makes an inverted Y cutaneous incision into the perineum, the remainder of the operation being done by blunt dissection, with the exception of the central tendon and recto-urethralis muscle. The urethra is then entered, the mucous membrane engaged with forceps, and the tractor introduced, in bringing the prostate in the wound. Incision is made into the capsule over each lateral lobe and the gland removed with blunt dissection and the fingers. A drainage tube is sutured at the apex of the skin wound. The patient is given plenty of water to drink. Subsequent instrumentation is avoided, and the patient is got out of bed as soon as possible.

Suprapubic prostatectomy is a favorite operation among many surgeons who claim better results from this operation than any other method. The advantages claimed are, that the growth can be seen, the access to the gland is better, and therefore hemorrhage more easily controlled and calculi easily removed, if the occasion presents itself. The operation is as follows:—suprapubic cystotomy is performed and the bladder sutured to the parietal incision, the prostate is then inspected and the projecting over-growth removed. Incisions are made into the mucous membrane of the bladder and the portions of the gland enucleated by blunt dissection. The hemorrhage can then be controlled by hot

irrigations and packing and a drainage tube inserted through the suprapubic opening.

Bottini's operation.—The indications for this operation are cases in which there is a middle lobe projection with the formation of an obstructing bar, and where there are healthy bladder walls. These facts should be ascertained by the use of the cystoscope. The patient is placed flat on his back, the bladder and urethra irrigated with a warm normal salt solution, allowing a few ounces to remain in the bladder (or air may be used to distend the bladder walls). General or local anæsthesia may be used in performing this operation.

The instruments (Fig. 47) should always be first tested and the exact amount of current ascertained to bring the blade to a white heat. Assurance being obtained that the apparatus is working satisfactorily, the instrument is then passed into the bladder and its beak turned down into the post-prostatic pouch and then drawn (as shown in Fig. 48) forward until it engages the obstruction. The shaft is now kept cool by means of a constant stream of cold water and the current turned on. After a few seconds, the exact time of which had been previously obtained, in order to bring it to a white heat, the wheel at the end of the instrument is slowly turned for the distance necessary to traverse the obstruction. The incision thus made, the wheel is reversed and the current immediately turned off by an assistant or preferably an electrician, and the blade returned to the groove in the shank. The first incision having been made on the median line, the instrument is slightly turned upward towards the lateral lobes which are incised in the manner thus described. The hemorrhage following this operation is comparatively slight and in proper cases renders the method, therefore, preferable to any other. The untoward

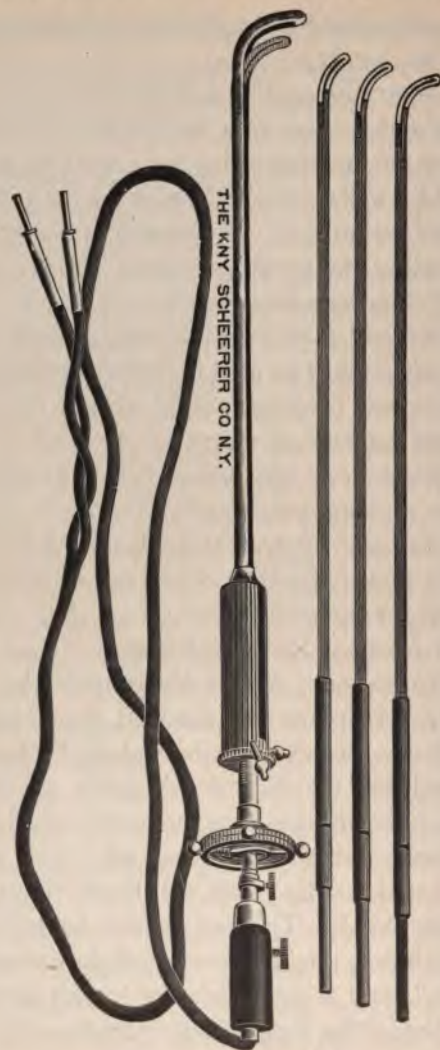


FIG. 47.—The Bottini galvano-cautery. Young's modification of the Bottini incisor with blades of various sizes.

complications which may follow it are: abscess of the prostate, epididymitis, and very rarely sepsis. The after treatment simply consists of keeping the patient in bed, and

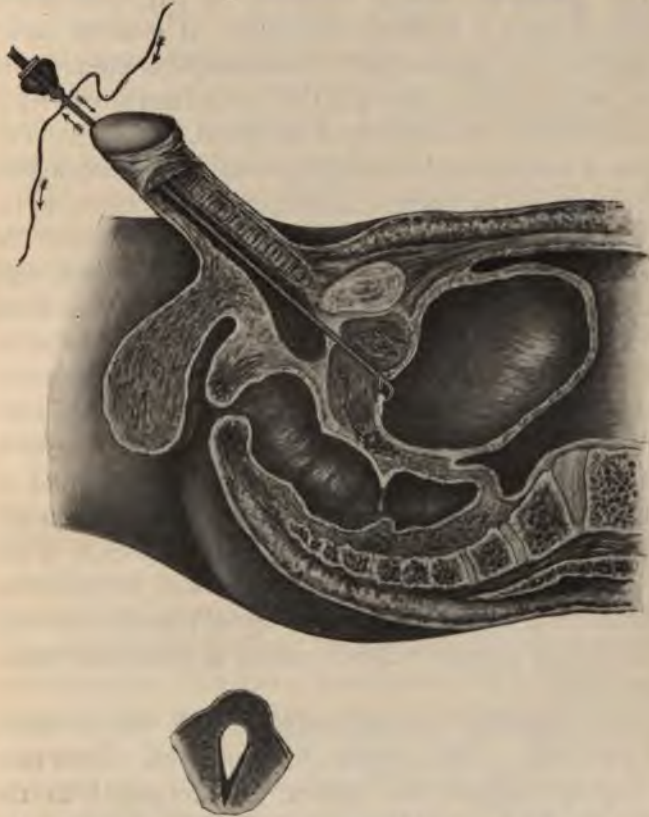


FIG. 48. The Bottini incisor in use. (After Socin and Burckhardt.)

allowing him to urinate alone, but if necessary he may be catheterized. In cases of advanced carcinoma Bottini's operation is preferred as a palliative operation.

ORCHIDECTOMY and VASECTOMY have rightly been condemned, as both methods are regarded as useless.

Treatment of retention of urine from hypertrophy of the prostate.—Should retention at any time occur, immediate relief is of course indicated. It must be borne in mind that the obstruction to be overcome is the pressure of the swollen lateral lobes and the upward and often irregular projection of the isthmus of the gland. (Fig. 43.) The urethra is tortuous and elongated perhaps. The instruments required are one for lateral enlargement of elongated or tortuous urethra, and one with a soft and pliant extremity. The Nelaton catheter, so stiffened as to give a firm shank, with flexible point, will answer. For the projection of the third lobe an upturned tip with a soft and pliant beak is suitable. The Mercier elbowed catheter, Coudé or Bicoude catheter possesses these qualities; and for practical purposes, if sufficiently stiff in shank, or stiffened by the insertion of a whalebone, or filiform, is well suited for catheterization in all cases of senile prostatic enlargement, is long enough to reach the bladder and sufficiently pliant (especially if the lower end be first immersed in warm water) to follow the tortuous urethra, and its elbowed tip will easily ride over the projecting isthmus without catching or producing unnecessary pain.

Before beginning the manipulation, it is well to inject into the orifice of the urethra a little olive oil. Then having slightly stretched the urethra, and keeping it in the median line, insert into the meatus the beak of the Mercier catheter, tip upward. Then taking care not to engage the tip in the lacuna magna, press down the instrument until its point can be felt at the enlarged prostate. Then firmly *and gently* press it onward. As the beak passes between

the lateral lobes their pressure can be felt, and when it mounts over the isthmus, that also can be detected. The bladder cavity is thus reached, and the evacuation accomplished, a few drams of urine being left to prevent any after shock. The soft-rubber Nelaton or Coudé catheter is used in a precisely similar manner, its upper portion having been stiffened by the insertion of a whalebone or filiform. As described, the insertion of a catheter in this form of retention is not productive of much pain.

The overcurved long English prostatic catheter has been strongly advised by Sir Henry Thompson. This when softened by warm water may undoubtedly be passed in many instances. The Mercier and Nelaton catheters, however, if used as described are sufficient to reach satisfactory results. The soft instruments are better fitted for introduction through an enlarged and tender prostate than metal instruments.

Tuberculosis of the prostate frequently develops secondarily, in cases of tuberculosis of the genito-urinary tract. Primary tubercular infection of the prostate is rare, and is usually seen in early life. The course may be gradual or rapid. The principal symptoms are pain, particularly on urination, and a profuse mucopurulent discharge increased on defecation. On rectal examination the nodules may be distinctly felt, in most cases, unless the urethral part of the prostate is the seat of the disease itself. Massage of the prostate and the expressed secretions in the urine following it should be examined microscopically. This procedure will in many instances corroborate the diagnosis.

TREATMENT.—The condition may be much benefited by warm irrigations of the bladder and rectum, followed by instillation of iodoform in sweet-oil (10 per cent.), or creosote

in liquid vaseline (2 per cent.). These measures are especially valuable even where ulcerations of the urethra have taken place. Change of climate may also be advised in conjunction with the local treatment. Tubercular abscess of the prostate should be drained through an incision in the perineum, just in front of the rectum. After the pus is evacuated, pack with iodoform gauze.

Prostatic calculi are sometimes deposited in the follicles of the prostate, where they often become encysted. They consist largely of phosphate of lime.

SYMPTOMS.—Such deposits are marked by irritability of the posterior urethra, pain in the deep urethra, extending down towards the rectum. In some cases they can be detected by digital examination of the prostate by way of the rectum. The treatment is necessarily surgical, and simply consists of making a perineal incision, through which the calculi are extricated.

Malignant growths.—**CARCINOMA** is more frequent than sarcoma, both of which are comparatively rare. Albarran and H. H. Young claim that about ten per cent. of all prostatic enlargements are carcinomatous.

The **SYMPTOMS** in the beginning are practically those of benign hypertrophy. Suddenly the patient is attacked with severe pains which may be constant or intermittent, radiating in all directions. The prostate will be tender to touch, and when this is seen in men past 50 years of age, should always be viewed with suspicion, especially, if there be marked induration with the enlargement of the gland, nodular in character, and where the cystoscope shows but little intra-vesicular prostatic outgrowth. The urination is increased in frequency day and night and soon the patient suffers from constant pain and tenesmus. This condition

in a short time is complicated with cystitis, sometimes with retention, and kidney lesions, the result of ascending infection and urinary obstruction. Hemorrhages may follow, occurring independently of any effort to empty the bladder. Involvement of the pelvic glands occurs late, and the patient's general health declines.

TREATMENT.—Young's method in dealing with these cases, especially where the diagnosis of malignancy is doubtful, is as follows: The posterior surface of the prostate is exposed, as for an ordinary prostatectomy, longitudinal incision made on each side of the urethra and a piece of tissue excised for frozen sections and examined microscopically. This he states can be done in six minutes. If the disease is malignant, the incisions are immediately cauterized and closed and the radical operation performed through a suprapubic incision. The removal of the growth is followed by inserting a drainage tube through the suprapubic opening and frequent irrigations of the bladder.

CHAPTER IX.

SURGICAL AFFECTIONS OF THE KIDNEY.

Surgical anatomy.—The kidneys are situated on the posterior wall of the abdomen, behind the peritoneum and extend from the 11th rib to the 3rd lumbar vertebra or almost to the crest of the ilium. The left kidney is a trifle higher than the right on its upper surface, but the lower ends are the same. The posterior surfaces are in close relation with the diaphragm above. The front of the right kidney lies in close contact with the duodenum and ascending colon. It is also close to the ascending vena cava. In front of the left kidney are the descending colon, the spleen, stomach and tail of the pancreas. The internal border of the psoas muscle, imbedded in a layer of fat and enveloped by a fatty capsule which in conjunction with the renal artery and vein and the ureter maintains the position of the organ. The relation of the kidneys to the anterior abdominal wall is as follows: The upper pole of the kidney with its suprarenal capsule is in the epigastric region. The lower pole corresponds to a line drawn from the middle of Poupart's ligament to the cartilage of the 8th rib, at the level of the umbilicus. The kidney is a slightly movable organ.

PERINEPHRITIS.

Inflammation of the cellular tissues surrounding the kidneys which in most instances undergoes suppuration and

abscess formation, hence the term perinephritic abscess. Perinephritis may occur secondarily by extension from suppurative processes in the abdominal viscera, pelvis, bones, lung and pleura, also from pyelitis, pyelonephritis and pyonephrosis, etc. The primary form is much less common and is that form in which suppuration begins in the postrenal connective tissue and is usually caused by traumatism. The abscess cavity may rupture into the colon or stomach and into the pleural cavity or within the sheath of the psoas muscle and burrow toward the femoral or gluteal regions forming urinary or renal fistulæ.

SYMPTOMS.—The perirenal lesion is usually obscure owing to the fact that it is most often secondary to disease elsewhere, hence the symptoms will center in other affections until the perinephritis is sufficiently advanced to give rise to distinct symptoms. When the lesion is traumatic the condition as a rule is easily recognized. *Deep seated pain* in the loins may develop insidiously or suddenly. In thin patients bimanual palpation over the abdomen and loin of the affected side will furnish some information or at least suspicion of perinephritis. The pain soon extends into the legs and is aggravated by motion and the condition may become so severe that the leg is flexed upon the abdomen and the body bent forward. This is accompanied by more or less fever, chills, rigors and vomiting. Fluctuation may be felt in the lumbar region in some cases. This is often attended with swelling and discoloration.

TREATMENT.—The diagnosis being firmly established the patient should receive treatment identical with that directed for any of the suppurative diseases of the kidney. When there is abscess formation, the pus must be evacuated by a free lumbar incision and the cavity and surrounding tissues

Surgical intervention therefore should not be delayed, in serious cases.

TREATMENT.—When due to obstruction or kinking of the ureters, an operation should be immediately performed to relieve the condition. Impacted ureteral calculi can be sometimes dislodged by means of the ureteral catheter and the hydronephrosis drained. Aspiration or nephrectomy are indicated where these methods fail. Nephrectomy should be resorted to after ascertaining the condition of the opposite kidney.

RENAL CALCULI.

Stone in the kidney may consist of one or more salts deposited around nucleus depending upon the state of the urine during the disease process of the kidney, or of its pelvis. They may be composed of urates, oxalates or phosphates, while the nucleus usually consists of a blood clot, tissue detritus, mucus and epithelium held together by an albuminoid substance, which is present when the urinary tract is diseased. The pelvis or the renal parenchyma may be the seat of the stone. They may be single or multiple, varying in their shape, size and consistency and are said to occur more frequently in men than in women. A sedentary life is probably conducive to stone formation.

SYMPTOMS.—These depend on the amount of ureteral obstruction and the inflammation it produces as a foreign body in the kidney. Years may elapse in some cases before its presence will cause any discomfort, though in most instances there is intense pain occurring at brief intervals. These attacks are often spoken of as renal colic. The pain is in the lumbar region and deep seated. Instead of being confined to this one area it may extend into the scrotum causing

retraction of the testicle. Increased frequency of a painful micturition, vesical and rectal tenesmus are symptoms not uncommonly met with in cases of renal calculi. In rare cases even suppression of urine occurs. Hæmaturia is another very important symptom and is usually characteristic in that it often follows a sharp attack of pain, and seldom lasts long. Small calculi or fragments may be passed with the urine during or after severe colic. Pyuria is only present where there is infection of the kidney tissue. Nausea and vomiting also accompany these symptoms. In conclusion the symptom complex of renal calculi may for convenience be summed up as follows:

Attacks of renal colic.

Deep seated lumbar pain.

Ephemeral hæmaturia.

Pyuria in infected cases.

Frequent and painful urination.

Gastro-intestinal disturbances.

Passage of fragments of calculi.

DIAGNOSIS.—Chemic and microscopic examination of the urine, careful review of the patient's history of previous attacks, the diathesis, etc., should be made. The kidney on palpation is tender and tense. An X-ray examination should always be made and the evidence obtained is nearly always conclusive unless the patient is very large and fat, in which instance the stone may not show. (Fig. 49.) Lumbar incision and palpation with the finger and exploring by a needle has also been practised, but this is rarely necessary since the advent of the X-ray.

TREATMENT.—The palliative measure consists in correcting the condition of the urine where the patient is passing sand and gravel. In these cases the kidneys should be

flushed by allowing the patient an abundance of drinking water. Any severe pain may be temporarily relieved by the use of morphia, hot baths, hot applications over the kidney and hot rectal irrigations are also useful. The diet should be light and nutritious. Surgical intervention becomes



FIG. 49.—Roentgenogram showing multiple calculi in the right kidney.
(Courtesy of Dr. Loux.)

necessary when the stone is impacted, threatening suppuration, hydronephrosis or pyonephrosis. Nephrolithotomy is the operation of choice in these cases.

TUMORS.

The benign growths frequently found in the kidney are: *papilloma*, *fibroma*, *adenoma* and *lipoma*. These may be

either in the pelvis or kidney proper. *Sarcomata* and *adenomata* constitute the malignant type. *Cysts* may also occur in the kidney but are rare. The benign neoplasm rarely gives rise to any serious disturbances and may exist during the life of an individual without even being noticed. *Sarcomata* are most frequently found in children and infants but may occur during adult life. *Adenomata* are found in the cortex of the kidney and may remain small for years while in some cases they may rapidly undergo carcinomatous changes.

SYMPTOMS.—The symptoms of renal neoplasm are generally very obscure, rendering the diagnosis very difficult. Pain may be present or absent, and is not characteristic of tumor. *Hæmaturia* is also a common symptom. Emaciation, anæmia, nausea, and vomiting are all more or less constant symptoms.

TREATMENT.—A diagnosis having been clearly established, e.g., by an exploratory incision and the competency of the opposite kidney ascertained. Nephrectomy is the favorite operation.

CYSTS OF THE KIDNEY.

These may be congenital or acquired, large or small, single or multiple. They may be situated either in the pelvis or kidney substance proper. Hydatid cysts of the kidney are very rare.

TREATMENT.—Nephrectomy and drainage is usually all that is necessary, but in severe cases partial or complete nephrectomy may be performed.

FLOATING OR MOVABLE KIDNEY.

Dislocation of the kidney or nephroptosis as this condition

is sometimes called, occurs in two forms: MOVABLE KIDNEY, in which the organ is situated behind and outside of the peritoneal cavity, and FLOATING KIDNEY, or that form which is completely enveloped by a fold of peritoneum and is supplied by a mesonephron which allows the kidney to move about freely in the peritoneal cavity.

ETIOLOGY.—It occurs more frequently in females than in males, and is supposed to be due to laxity of the abdominal walls as a result of pregnancy and to absorption of the fat around the kidney in consequence of emaciation occurring in wasting diseases. The least muscular effort is often sufficient to loosen the kidney from its attachments.

SYMPTOMS.—Gastro-intestinal disturbances, e.g., flatulence, dyspepsia, almost invariably attend the condition of movable kidney. As described by Edebohls pain is felt in the epigastrium which is not increased by pressure. General nervousness accompanied by cardiac palpitation, sleeplessness, irritability of temper also accompany this train of symptoms. The patient experiences the sensation of something moving about in the abdomen. Intense pain due to sudden kink of the ureter known as *Ditel's crisis* may be encountered in these cases; with this, symptoms of general prostration, nausea and vomiting, fever, chills, etc., are not uncommon.

DIAGNOSIS.—In thin subjects by bi-manual palpation of the flank, the movable kidney may be usually recognized.

HOW TO PALPATE A MOVABLE KIDNEY.—In conducting this examination, the patient either stands while the manipulator is seated or both may be standing. The patient may also lie on his back, or on either side, depending on the side to be examined. The patient is then told to take a deep breath while pressure with one hand over the lumbar region *between the fixed border of the ribs and the crest of the*

ilium forces the organ upward, while the hand on the abdomen gently presses toward the hand on the back.

PROGNOSIS.—A movable kidney is never fatal in itself, but the danger sometimes lies in its consequence. Surgical measures are usually necessary because a dislocated kidney rarely becomes fastened in place again by any other means.

TREATMENT.—An elastic abdominal bandage about 5 inches wide encircling the abdomen between the ribs and iliac crest with a loose kidney pad inserted over the cæcum. The upward pressure thus comes from below, crowding the viscera higher into the abdominal cavity and thereby supporting the kidney. Corsets and braces of various kinds have also been devised for this purpose. Gallant's corset is perhaps the most popular one used. When these methods fail, nephrorrhaphy (fixation of the kidney) should be advised. If this be unsuccessful, nephrectomy must be performed as a last resort after first ascertaining that the opposite kidney is functioning normally. This operation unfortunately has a very high mortality, therefore should only be done in extreme cases—where there is no other alternative.

TRAUMATISMS.

The kidney may be the seat of direct violence producing contusion of the organ or the injury may be due to stab or gunshot wounds. The treatment depends upon the extent of the injury, the judgment and experience of the surgeon.

SUPPURATIVE AFFECTIONS OF THE KIDNEY.

The suppurative inflammations of the kidney or of its pelvis or both together are pyelitis, pyelonephritis, pyonephrosis, suppurative nephritis and perinephritis.

Pyelitis and pyelonephritis.—These two conditions are so intimately allied that they may be described under one heading. They are usually the result of inflammation of pelvis of the kidney and its calices with consequent dilatation of these outies. The tissues of the pelvis, calices and even the parenchyma may be included in the inflammatory process. The pathological changes which take place are acute and chronic hyperæmia and congestion and in severe cases infiltration and degenerative changes in the kidney structure due to the secondary invasion of pyogenic micro-organisms.

ETIOLOGY.—Extension of the morbid inflammatory process from the bladder and ureters as a result of urethral stricture, prostatic hypertrophy and vesical paralysis. This ascending infection may result from obstruction of the ureter. In not a few instances the gonococcus was the infecting agent. Descending pyelitis and pyelonephritis may also occur from the acute and chronic infectious diseases such as diphtheria, typhoid fever, pyæmia, septicæmia, caries of bones, appendicitis, osteo-myelitis, etc., due as a rule to contiguity of the tissue to the infecting foci. This affection may be of the simple catarrhal or suppurative type. The lodgment of sand, gravel or calculi may also give rise to pyelitis and pyelonephritis, which conditions are termed by many as calculous pyelitis and pyelonephritis and *nephrolithiasis* due to irritation or obstruction. It is stated that this affection is more frequent in men than in women. Traumatism to the kidneys, foreign bodies, malignant neoplasms may also figure in the etiology of pyelitis and pyelonephritis. Among the other causative factors are elimination by the kidneys of such irritant drugs as creosote, cantharides, *carbolic* and *turpentine*, balsams, chloroform, etc. Tuberculosis

occurring either primarily or secondary to the disease in other structures, e. g., ureter, bladder, prostate, testes and vesicles.

PATHOLOGY.—The pathology of both pyelitis and pyelonephritis differs only in degree. In pyelitis the pelvis and calices are dilated. They may contain pus, mucus, and urinary concretions. In pyelonephritis the organ is slightly increased in size, congested and dotted with foci of pus, enclosed in an area of hyperæmia, which are minute abscesses due to microbic infection. These sooner or later coalesce forming larger abscesses involving the pelvis, calices and parenchyma of the kidney. The walls of the ureters are inflamed and thickened and may contain pus and fibrin. The various micro-organisms which cause inflammation of the kidneys are *B. coli* commune, staphylococci, streptococci, tubercle bacilli and gonococci.

One or both kidneys may be attacked by a chronic pyelonephritis.

SYMPTOMS.—The condition may be so mild that the only symptoms complained of by the patient will be slight pain in the loins. In acute cases (which are rare), usually produced by gravel and chemical irritants, and coming on suddenly, he will suffer from headaches, fever, chills, sweating, dry tongue, nausea and great weakness. The pain in the loins is aggravated by pressure or deep respiration and motion. The urine is scant and contains mucus, pus, blood and renal epithelium. The pain sometimes is reflected into the penis and testicles. In chronic pyelitis with pus formation the symptoms are more marked. The pain is more severe. This may or may not be polyuria but the amount of pus present is increased and in consequence of the blood pus and mucus, the urine is highly albuminous. The microscope

will show renal epithelium, hyaline casts and pus cylinders. As the condition becomes intensified the patient passes into a state of chronic invalidism. He becomes thin, weak and anæmic, loses all appetite and suffers from fever and chills. Unless operation is performed death inevitably occurs. In ascending pyelonephritis from a preexistent cystitis, examination of the urine is often unsatisfactory especially where ammoniacal decomposition has taken place. In such cases the lesion is not ascertained until at an autopsy.

DIAGNOSIS.—The important point to determine in the diagnosis of pyelitis or pyelonephritis is whether the condition is due to ascending or descending infection. This may be usually accomplished by physical examinations and repeated microscopic studies made of the urine and a careful history of the patient's previous health, habits, etc. As an aid to the diagnosis in these cases, catheterization of the ureters, cryoscopy and segregation may be of much value in determining the extent and the character of the lesion and whether the condition is unilateral or bilateral, the presence of calculi, etc.

TREATMENT of pyelitis consists in keeping the patient in bed, giving a light nutritious diet, local applications or counter irritation and the skin kept active by hot baths. The urine should be rendered bland and the patient allowed to drink of the mineral waters freely. Pain if severe, relieved by morphia. Operation must be deferred until the acute symptoms subside. If the pyelitis is due to obstruction, the cause ascertained and removed by surgical measures, if necessary. Ureteral calculi can often be dislodged by the ureteral catheter and an oil injection (see p. 236). In pyelonephritis the treatment is practically the same as for pyelitis. It is important in this condition to administer urotropin,

boric acid and salol so as to keep the urine aseptic. Otherwise the principles of treatment are identical with those of pyelitis.

Renal tuberculosis when of primary development is not attended with any well marked symptoms. Where the affection is secondary to tubercular lesions of other structures, it may not become manifest until the patient complains of pain in the loins, and by frequent and sometimes painful micturition. These will eventually be accompanied by gradual emaciation, hectic fever, pyuria and night sweats and vesical tenesmus unless relieved by an operation. The kidney may be palpably enlarged. Microscopically the urine will be found to contain blood, pus, renal epithelium, tissue detritus and tubercle bacilli. The quantity of blood lost is variable, may be slight or copious, occurring at regular intervals.

DIAGNOSIS.—In early cases the diagnosis must depend upon the findings of the cystoscope and the presence of tubercle bacilli in the urine. The loss of weight; anæmia, and the existence of tuberculous processes elsewhere, will usually furnish sufficient data to establish a clear diagnosis of all the forms of pyelitis and pyelonephritis.

TREATMENT.—The extent of involvement of the bladder and the presence of tuberculosis elsewhere have an influence on the course of treatment. If the anti-tuberculous treatment is of no benefit and pus should form, it must be evacuated by a lumbar incision or nephrotomy. Nephrectomy is a dangerous procedure because of the fact that the other kidney is likely to be attacked by the process sooner or later. If possible patients suffering with renal tuberculosis should be removed to a suitable climate and given energetic constitutional treatment.

OPERATIONS ON THE KIDNEY.

The kidney may be accessible for palpation, exploration and extirpation through the posterior abdominal wall, by incision in the anterior abdominal wall. The former or extra-peritoneal route is much preferred as it avoids injury to the peritoneum with less danger of peritonitis. The presence and condition of the opposite kidney should always be ascertained before undertaking any operation on the kidney. The various incisions designed to reach the kidney are as follows:

The **SIMON** or vertical incision is made from the eleventh rib along the outer border of the erector spinæ muscle to the iliac crest. The subcutaneous fat and latissimus dorsi and transversalis fascia being divided to the same extent and retracting the fibres of the quadratus muscle, cutting the fascia beneath it when the fatty capsule of the kidney comes into view.

CZERNY'S incision is oblique, extending from an inch below the twelfth rib and parallel to it from the outer border of the erector spinæ downward and outward for the required distance carrying it to the level of and toward the umbilicus.

KOENIG'S incision consists in a V shaped incision, beginning at the lower border of the twelfth rib extending down on a straight line along the outer edge of the erector spinal muscle until the level of the umbilicus is reached when it turns forward almost at right angles toward the umbilicus for the required distance.

An incision made in the linea alba or in the linea semilunaris is advised by **LANGENBUCH** in providing access to renal tumors. The lateral incision is made through the linea semilunaris from the costal cartilage downward to as near *Poupart's* ligament as may be necessary.

Nephrotomy consists in making an incision into the kidney for exploratory purposes or for drainage in suppurative conditions and hydronephrosis and is always conducted through the loins.

TECHNIQUE.—The ether is administered preferably by means of the Stellwagen ether inhaler as shown by the accompanying illustration. (Fig. 50.) From a glance its

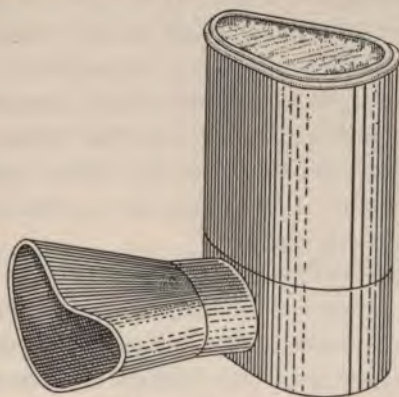


FIG. 50.—Stellwagen's Ether Inhaler.

advantages to the reader must be obvious, particularly in operations on or about the kidney. The patient is then placed on the opposite side with a sand bag pressing into the flank. The kidney is now forced up into the loin by pressure on the anterior abdominal wall. The kidney may be exposed by any one of the various lumbar incisions described above, but preferably by the oblique (Koenig's) incision, care being taken to avoid injury to the pleura. The field of operation should be kept dry as possible. The fatty perineal capsule having been exposed is torn through and the kidney brought into the wound, whose walls are retracted. An incision is

now made into the kidney pelvis through the outer border, and the organ explored and any abnormal contents evacuated and the cavity drained with strips of gauze or a rubber tube around which the wound is packed and one or two sutures taken at each angle. In hydronephrosis, drainage is unnecessary. The kidney wound may be closed with sutures and the outer wound treated likewise.

Nephrolithotomy.—This consists in the performance of nephrotomy as just described for the removal of renal calculi. Hemorrhage which may sometimes be profuse in this operation may be controlled by digital compression of the artery or by gauze pressure. After the stone is extracted by proper forceps the wound of the kidney may be united by deep and superficial sutures and the external wound closed with or without drainage.

Nephrectomy.—Total removal of the kidney is performed either by the lumbar or abdominal route. The former is the operation of choice. The indications for this operation are—extensive injuries to the kidneys or ureters, tumors of the kidney, intractable renal fistulæ, surgical kidney, renal tuberculosis and rarely for movable kidney. The existence and condition of the other kidney must be ascertained previous to the operation—a step of the utmost importance. Lumbar nephrectomy consists in making a lumbar incision, bringing the kidney well up into the wound, freeing it from all its attachments or adhesions, ligating the vessels and ureter and divided between the two ligatures. The wound should then be closed or drained, packed and partially sutured as may be necessary. Abdominal nephrectomy is the same in its principles as by the lumbar route except that the abdominal incision is made in the linea semilunaris. After *the kidney* is enucleated as in the lumbar operation the

peritoneum is sutured over the perirenal fat and the abdominal wound closed unless there is some contraindication.

Nephrorrhaphy or nephropexy.—Fixation of movable kidney is performed by making a lumbar incision, preferably the Simon or vertical incision and anchoring the kidney in its normal position by passing several silk or gut sutures through its substance from its anterior to its posterior surface below the convex border and then through the lumbar fascia so that when these sutures are tied, the kidney is held firmly against the posterior abdominal wall. The edges of the parietal wound may be approximated or left open for drainage. When this method fails to hold the kidney in place and several attempts have been tried, nephrectomy is advised by many surgeons.

RENAL DECAPSULATION OR REMOVAL OF THE PERIRENAL CAPSULE.

Edebohls says: "Renal decapsulation is performed with the object in view of creating new and liberal supplies of arterial blood to the diseased kidney. The denuded kidney and its fatty capsule are most liberally supplied with blood vessels. Both are brought together by the operation over the entire surface on the kidney, and new and large blood vessels form between the kidney and the surrounding fatty tissue. The normal capsule of the kidney forms a barrier to this new supply of blood made possible by a decapsulation."

This increase of blood supply to the kidneys which Edebohls claims to occur improves the circulation in the organ and assists in removing waste products. The portion of the kidney not diseased takes on an increased function and the disease might be checked.

It has been observed that a factor which probably has considerable to do with the improvement which is noticed during the first few days after a decapsulation is the massage which the kidneys receive at the hands of the surgeon during the operation. It seems plausible to believe that this manipulation temporarily relieves the congestion and inflammation which exists. Considerable testimony has accumulated pointing to the improvement being due to the relief of renal tension by decapsulation.

CHAPTER X.

AFFECTIONS OF THE BLADDER.

CYSTITIS.

The various types of inflammation of the urinary bladder depend for their classification largely upon the etiological factor, their being designated accordingly and are as follows:

VARIETIES.—When due to bacteria it is termed SEPTIC or SUPPURATIVE CYSTITIS. Inflammation due simply to irritants and not bacteria which is of short duration constitutes the so-called ASEPTIC or SIMPLE CYSTITIS.

Septic cystites have been subdivided into *suppurative*, *simple* and *chronic*; *catarrhal*; *ulcerative* (hemorrhagic), *membranous* (or diphtheritic) and tubercular cystitis.

PERICYSTITIS or inflammation of the tunica adventitia.

PARACYSTITIS or inflammation of the tissues surrounding the bladder.

ETIOLOGY.—Cystites occurring during the course of acute *infectious diseases*, e.g. typhoid, scarlet fever and diphtheria, constitutional diseases, particularly diabetes and gout, and the septic conditions such as erysipelas and pyæmia. Vesical paralysis due to paraplegia or myelitis may also give rise to inflammation of the bladder.

Chemic irritants, e.g. turpentine, cantharides, ammonia, and strong instillations may give rise to cystitis.

Exposure to cold and wet and traumatism may cause cystitis.

Descending infection from the ureters and kidney and *ascending infection* from the urethra are very prolific sources of bladder infection.

Vesical calculus, tumor and prostatic disease may also cause cystitis.

Cystitis is a very common sequel of *gonorrhœa* and is often due to instrumentation during the course of the disease, or the infection of the bladder occasioned by contiguity.

Cystitis commonly originates from the use of *rough or unclean instruments*.

Residual urine occurring as a result of stricture and enlarged prostate may cause inflammation of the bladder due to irritation of the decomposed and sometimes infected urine.

The *bacillus coli communis* is found in the majority of cases usually in an acid urine.

The *uro-bacillus liquifaciens* is another important organism found principally in neutral or alkaline urines and has the power of decomposing urea, causing the urine to become alkaline within a few hours.

The *streptococcus pyogenes, staphylococci* and *diplococci* have also been found in the urine in cystitis.

PATHOLOGY.—Congestion of the bladder undoubtedly predisposes to cystitis; in chronic congestion there is always more or less round cell infiltration and proliferation of connective tissue, impairing the vitality of the part, and rendering the tissues extremely susceptible to infection by pyogenic micro-organisms.

In nearly all cases of chronic cystitis, hypertrophy of the muscular coat with subsequent fatty degeneration and dilatation or sometimes fibrous overgrowth causing contraction and muscular atrophy, the bladder is in these cases, perhaps *ribbed and sacculated*, forming a favorable lodgment of

calculi, due to precipitate of decomposed and ammoniacal urine, usually on the posterior wall. In extreme conditions there are often produced false diverticulæ due to protrusion of the vesical mucous membrane through a weakened area of the muscularis.

URINARY SIGNS.—The microscopic appearance of the urine may show but little change and may be acid or neutral in reaction. On standing, a light sediment collects and the supernatant urine becomes clear, where previously it was more or less turbid. Where there is considerable pyuria, albumin is present as a constituent of pus. Blood may also be contained in the urine and may be scant or profuse as clots. In most cases the urine will be found neutral, alkaline in reaction and ammoniacal. It is turbid, and contains pus and sediment. Upon standing the supernatant urine does not become clear. Microscopically there will be found degenerated pus cells, vesical epithelium, fragments of tissue, necrosed membrane, crystals of triple phosphates, ammonium urates and hyaline tube casts, cylindroids and bacteria.

LOCAL SYMPTOMS.—*Pain* is early and constant over the pubes or in the perineum and often aggravated by micturition, which may be spasmodic and straining in character preceding the act and relieved when the bladder is empty. Other times there may be burning along the urethra during urination, and especially severe at the meatus and may continue some time thereafter. The pain is significant of the severity of the inflammation, the degree of obstruction, presence of stone, ulceration, etc.

FREQUENCY OF URINATION.—Attends all cases of cystitis as the condition advances. This is usually due to irritation and decreased capacity through oversensitive mucous membrane and contracted bladder walls. Vesical tenesmus is

constant in all marked cases of increased frequency of urination.

CONSTITUTIONAL SYMPTOMS.—Fever, chills and sweating often accompany the acute form of cystitis. Gastro-intestinal disturbances, e. g. loss of appetite, dyspepsia, flatulence and constipation likewise frequently occur. Headache, vertigo, insomnia, and irritability of temper are also a few of the nervous features often encountered. Symptoms of septicæmia and pyæmia must be carefully noted, especially in severe cases where there are damaged kidneys as a complication.

PROGNOSIS.—In simple cystitis it is always favorable. When due to infection it must be rendered according to the extent of the involvement and the accompanying complications. The danger of ascending infection must be remembered.

DIAGNOSIS.—None of the symptoms are pathognomonic of any one form of cystitis, therefore definite conclusions cannot be reached until cystoscopic examination has been made. By this modern acquisition to diagnosis, the recognition of the various diseases of the urinary bladder is comparatively easy. It cannot be used however in acute cases as it would only increase the irritation. In chronic cases the cystoscope is indispensable. By its use the presence of calculi, tuberculosis of the bladder and malignancy of the presence of enlarged prostate can be readily recognized.

TREATMENT.—The cause of the cystitis must always be ascertained and then such measures adopted as will remove it if possible, and repair the damaged tissues. The acuteness and the severity of the attack and the changes in the urine as well as any form of obstruction to the free outflow of the *urine* and the condition of the kidneys, ascertained by

urinary analysis, all serve as a guide to the method of treatment to employ. In acute cystites the rest in bed is imperative until the acute symptoms subside. The diet should be light, nutritious, and easily digested, e.g. milk, eggs, bland table waters, plain soups and broths. The patient should avoid red meats, green vegetables, and highly seasoned foods, also alcohol, coffee and cocoa. The skin must be kept active by warm baths, followed by an alcohol rub and massage. The bowels should be kept regular by laxatives if necessary. If there be much pain, hot sitz baths together with hot rectal irrigations will give much relief. This may be subordinated by hot applications over the bladder and on the perineum.

Tenesmus may be considerably relieved by suppositories of opium and belladonna and internally by morphia by mouth or by hypodermic injections. Where there is hyperacidity of the urine, some alkaline, preferably sodium or potassium bicarbonate is beneficial. This may be combined with tincture of hyocyamus. Vichy, either alone or with milk is also efficacious in these cases. Any symptoms of retention must be immediately combated by the hot applications and catheterization if necessary. In the subacute should there be irritability of the bladder and deep urethra, with frequency of urination, it is often relieved by the instillation of a few drops of nitrate of silver solution (2 grs. to the ounce) into the deep urethra through a soft rubber catheter or by means of a Keyes-Ultzmann syringe. Should the condition progress into the chronic stage, boric acid, salol (the latter where the urine is alkaline), in doses from 5 to 7 grains t.i.d., may be given. Oil of eucalyptus has also been recommended in chronic cystitis. The bladder should be irrigated at least once daily with warm, mild antiseptic solutions, through a

soft rubber catheter. The capacity of the bladder should be noted and when the patient experiences the first sense of fullness, the catheter is withdrawn and he is either allowed to evacuate the fluid alone or it may be allowed to drain off through the catheter, and the washings thus continued until the fluid comes away clear. By not continuing beyond the feeling of fullness, over-distension of the bladder is avoided. The solutions employed for this purpose are: boric acid (saturated sol.), normal saline solution, salicylic acid (3 to 1000 to break up adherent gelatinous pus), oxycyanide of mercury (1 to 8000), potassium permang, (1 to 4000) and (probably best of all) nitrate of silver beginning with strengths 1-8000 and increasing up to 1 to 1000. Instillations of 20 drops Ag No. 3 (1 to 5 grs. to the $\frac{7}{8}$ ounce) every 2d or 3d day is also recommended.

Cystitis complicated by calculus, stricture, tumor, foreign body, enlarged prostate, all call for surgical intervention.

VESICAL CALCULUS.

Stone in the bladder may originate either in the bladder or in the kidney, but probably the greater number come from the kidney, this being especially true of calculi containing uric acid nucleus. Stone never forms primarily in a perfectly normal bladder. The composition of calculi consists chiefly of uric acid and urates, oxalates and phosphates each of which has definite characteristics. They increase rapidly in size and weight by the addition of superimposed layers around the nucleus of any of these salts according to the chemical composition of the urine. These constituents are held together by the mucous element, without which stone formation does not occur. Calculus may be single or double, *being lodged* in the post-trigonal pouch. When more than

one, the surfaces are usually faceted and smooth. They may be free, adherent or encysted in the bladder walls; vary in size and shape, and may weigh from a few grains to several ounces. Oxalate of lime calculi (mulberry calculus) are dark gray in color, presenting rough surfaces and very hard in structure. Stones of uric acid and urates are yellow or yellowish red and soft. Phosphatic calculi consist of phosphates and carbonates, are light gray in color, very soft, and present a slightly roughened surface.

Calculus originating in a diseased bladder frequently has for its nucleus blood clots, pus and foreign bodies, these being superimposed by the addition of urinary salts.

SYMPTOMS.—The presence of stone in the bladder may or may not be attended with any marked symptoms. Usually, however, where the calculus is the least bit roughened or has attained any size, and where the bladder is filled with urine, it will give rise to a *dull aching pain* above the symphysis and in the groins, also in the thighs, testes, urethra and in the glans penis, often radiating through the perineum and rectum. This is aggravated by motion and relieved if the patient is in a recumbent position. This is due to the fact that if the bladder is full the stone, if free, is thrown up against the sensitive vesical orifice. *Reflex* pains in the sole of the foot and big toe are also common. *Priapism* may sometimes occur as a result of stone in the bladder. *Frequency of micturition* is another not infrequent symptom with sudden stoppage of the urine during the act. *Hæmaturia* is often seen and is due to injury to the bladder mucous membrane but is usually slight. Cystitis as a rule supervenes unless the stone is removed.

DIAGNOSIS.—The patient lies on his back with head and shoulders slightly elevated, the bladder is then drained

and irrigated and carefully explored by means of a Thompson stone searcher (see Fig. 51). It is well to leave about 6 ounces of



FIG. 51.
Thompson
Stone
Searcher.

the irrigating solution remaining so as to slightly distend the bladder walls. The sound being gently inserted for its full length and gently rotated in such a manner as to touch all parts of the bladder cavity especially the trigone. The presence of stone is easily detected by a sharp click, appreciable to the touch when it comes in contact with the instrument, unless it be thickly coated with pus or blood or if it should be encysted. When the searcher fails, a direct ocular examination of the interior of the bladder may be made with the cystoscope. The X-ray in such cases is another valuable aid to diagnosis, though this may sometimes fail to show the stone. The lithotaxy pump may be used where the stone searcher fails. The tube is inserted and water forced into the bladder with the bulb. By this procedure, when the water drains off, the stone strikes against the instrument and a click is felt or heard. In extreme cases and as a last resort, a suprapubic cystotomy may be performed for the purpose of exploration.

TREATMENT.—If there is an excess of crystals in a freshly voided urine or a passing of sand or gravel, their chemical composition should be ascertained and by such preventative measures should be taken as are calculated to correct the diathesis, and render the urine normal, if possible. The patient's general health must be attended to, by ordering daily exercise in the open air, the

ingestion of large quantities of table waters. An excess of nitrogenous foods, e.g. meats, sugar, fat should be forbidden.

If the urine is excessively acid, the administration of nitrate of potash is beneficial. If phosphaturia exists, urotropin 7 grs. should be given three times a day, and 10 drops dilute hydrochloric acid taken after meals.

OPERATIVE TREATMENT.—When stone has formed then radical measures are indicated. There are various methods chief of which are litholapaxy, lateral and median perineal lithotomy and probably the best of all suprapubic cystotomy. **Litholapaxy** consists in crushing the stone and the immediate removal of all its fragments. In children over 16 years of age and in adults, when the stone is encysted or very large or too hard this is considered the operation of choice when performed by an experienced operator. Litholapaxy is indicated only where the urethra is large enough to permit the passage of the instruments and where the stone is free and movable and of a moderate size and consistency. Contraindications to the performance of litholapaxy are extreme prostatic hypertrophy, tight stricture of the deep urethra, severe cystitis, contracted and irritable bladder, nephritis and suppurative pyelitis.



FIG. 52 —Bigelow lithotrite (open.)

TECHNIQUE.—After the rectum has been thoroughly emptied, the patient is anæsthetized and placed on his back with his hips elevated on a sand pillow and his thighs separated. The bladder is irrigated with boric acid solution and about 6 ounces left to remain. A moderate size Bigelow lithotrite (Fig. 52) is lubricated and passed through the urethra and into the bladder, its convexity pressed down against the fundus of the bladder in the median line and its beak pointing upward. The jaws are then separated when the stone will usually roll between them. They are now closed slowly and locked and gently rotated to ascertain that no vesical mucous membrane has been caught. By turning, the blades or jaws are brought together and the stone reduced to fragments. This is repeated until it is perceived that no fragments are left and the lithotrite closed and withdrawn. Evacuating of the fragments is the next step. The evacuating tube is introduced into the bladder and connected with Bigelow's evacuator (Fig. 53) which is filled with warm boric solution, the stop cocks opened and pumping or squeezing of the rubber bulb then begun. The fluid then flows out again into the glass receiver carrying the fragments. This is continued until the washing comes away clear. For children small lithotrites (size 15 to 20 F.) have been devised. The after treatment consists in keeping the patient in bed, allowing him to drink freely of water, an opium suppository may also be given immediately following the operation. The bladder and urethra are irrigated daily and internally urotropin or salol is given. Complications following litholapaxy, e.g. epididymitis, urinary fever, prostatitis, must be treated accordingly.

Mortality of this operation according to statistics of a large number of cases by Cabot are as follows:—Children under

14, 1.66 per cent.; adults 14 to 50, 3.25 per cent.; adults past 50, 6 per cent.

Perineal lithotomy.—This operation should never be performed on adults as the suprapubic route and litholapaxy are far superior methods. It is only indicated in children where litholapaxy and suprapubic operations are contradicted. The danger of hemorrhage, injury to the



FIG. 53.—Bigelow's Evacuator.

vesical neck and inaccessibility of the parts are some of its disadvantages.

TECHNIQUE.—The patient being in the lithotomy position, a curved lithotomy grooved staff is passed into the bladder and held firmly in the median line by an assistant who also holds the scrotum up out of the way. An incision is then

made three inches in length either on the median line one inch in front of, or a little to the left of the anus, downward and outward being careful not to wound the rectum. The bleeding is then controlled. The knife is now entered on the lateral groove of the staff and following along this, opening the neck of the bladder and cutting into the left lobe of the prostate. The stone is now grasped with forceps (Fig. 54) and extracted, and the bladder drained and irrigated in the usual manner.

In the *median operation* the technique is the same, with



FIG. 54. STONE FORCEPS.

the exception that the staff has a median groove, along which the incision is made, opening the membranous urethra and passing the finger into the bladder, thus dilating the prostatic urethra, through which the stone is extracted.

SUPRAPUBIC CYSTOTOMY.

By many genito-urinary surgeons this is considered the operation of choice and where litholapaxy is contraindicated it is universally employed.

TECHNIQUE.—The patient is anæsthetized, placed upon his back, with head and shoulders slightly elevated and a soft catheter passed into his bladder. A collapsed and oiled rectal bag is inserted into the rectum by an assistant. The bladder is well irrigated by boric acid solution, and 8 to 10 ounces retained (amount gauged by the capacity of the patient's bladder). The rectal bag is now distended by injecting

about 8 ounces of warm water through the tube which is then clamped with a hemostat. The bladder is then raised up from the pelvis, danger of injury to the peritoneum lessened. An incision is made in the median line upward, extending from a point just above the symphysis for a distance of about three inches. The prevesical fat is soon reached and pushed aside with the finger tip and the bladder wall exposed. On each side and into it are passed silk sutures which serve as retractors and between which the knife is thrust and following it immediately with the fingers as the fluid gushes from the wound and the stone caught with the stone forceps and gently removed, care being taken not to injure the bladder edges. The bladder is irrigated and drained through a large soft rubber tube, and its edges sewed securely around the tube to prevent the escape of urine into the prevesical space. The abdominal wound is then sutured above and below and the centre left open and packed with sterile gauze. In a day or two a smaller tube is inserted and a few days later the drainage removed altogether and the wound allowed to granulate. Any complicating cystitis should be treated in the usual manner and continued until the patient voids clear urine.

TUMORS OF THE BLADDER.

These may be of the *benign* or *malignant* type. The BENIGN GROWTHS frequently met with are, *papillomata* or *villous tumors*, *adenoma*, *fibroma*, *cysts*, *myxoma*. The MALIGNANT TUMORS are, *carcinoma* and *sarcoma*. Vesical neoplasms in most cases are malignant and usually located at the base of the bladder or near the ureteral openings. They may be sessile or pedunculated and most frequently occur after middle life.

SYMPTOMS.—If the growth is of a benign character and situated near the vesical orifice, it is most apt to be marked by frequency of micturition, hæmaturia and interference of the urinary outflow, simulating the presence of stone. Pain is never a prominent symptom unless complicated with cystitis. The hæmaturia comes on suddenly and apparently without any provocation and may last a few hours or many days, the quantity of blood passed varies.

DIAGNOSIS.—The presence of vesical tumor if it be large, can often be palpated by inserting one finger in the rectum and making deep pressure with the other hand over the pubes. A careful review of the symptoms and the patient's general condition noted will usually furnish sufficient data to base a diagnosis. Where there is not much bleeding or during the period when the urine is clear, the cystoscope affords a quick and accurate method of diagnosis. An exploratory suprapubic cystotomy is only indicated when all the other measures fail.

PROGNOSIS.—Malignant growths usually recur after the operation, owing to infiltration of the bladder wall and death generally ensues in 2 to 3 years after commencement of the growth. Benign tumors when once removed are not so likely to recur, although they very frequently do.

TREATMENT.—Removal of the growths especially in benign cases should always be advised as they are apt to undergo malignant changes if allowed to remain, or occasion a cystitis with secondary infection of the ureters and kidneys. Hemorrhage must be controlled by instillation of several ounces adrenalin solution (1 to 1000) or hot irrigations of alum solutions (4 drams to the pint). The patient should be kept at rest in bed and aseptic ergot given by the mouth or hypodermically if necessary. If there be much clotting

keep the bladder drained by means of a large urethral catheter.

SUPRAPUBIC CYSTOTOMY is the operation of choice in these cases. Pedunculated growths should be cut off at the junction with the bladder wall. If sessile, part of the bladder wall must be resected in order to remove all the diseased tissue. The hemorrhage in such cases must usually be controlled by the actual cautery, hot irrigations and packing. The bladder is drained by either a suprapubic or perineal tube or both as may be necessary. The tubes are removed as soon as possible and the wound allowed to granulate from below and the bladder kept clean by frequent irrigations and the urine rendered bland by internal medication.

EXSTROPHY.

The condition of extroversion of the bladder is due to defective development or insufficient anterior abdominal walls and the symphysis pubes. The bladder almost entirely bulges out of the abdominal cavity. Treatment is surgical and consists of a plastic operation, either with or without transplantation of the ureters. The edges of the bladder can in most cases be sutured and then a suitable apparatus worn so as to collect the urine from its most dependent part, which is easily removed without irritating the integument or soiling the clothing.

TRAUMATISMS.

The bladder is frequently the seat of incised, torn, contused or punctured wounds as a result of gunshot and stab wounds and fracture of the pelvis.

RUPTURE OF BLADDER.

This may occur as a result of either violence or of diseased (and weakened) bladder walls. The tear is usually intra-peritoneal.

SYMPTOMS.—The first symptom is sudden pain with a feeling as though something had broken or given way in the suprapubic region. This is attended with a desire to urinate and an attempt to empty the bladder is of no avail. Unless proper measures are employed, the patient soon passes into a state of shock and death ensues from septic peritonitis or pelvic cellulitis. If the urine is sterile, however, efficient measures are immediately instituted; the prognosis is more favorable.

DIAGNOSIS.—The patient's personal previous and present history must be obtained. Palpation of the abdomen and rectal examination will usually reveal the state of affairs when the swelling is in Douglas' cul-de-sac and adjacent tissues. A reliable test consists in passing a catheter into the bladder, injecting a known quantity of warm sterile salt solution and if the same amount is not withdrawn, the deduction is accordingly made. Care must be taken, however, that the catheter is not plugged in any way. The cystoscope is of no service in these cases owing to the profuse hemorrhage. Exploratory suprapubic cystotomy is performed when the other measures fail to establish a correct diagnosis.

TREATMENT.—If the rupture is extra-peritoneal, it may be closed and continuous catheterization employed or drainage obtained through the suprapubic opening and the prevesical space packed with sterile gauze to prevent urinary infiltration. Absolute cleanliness in this respect is imperative and any evidences of burrowing or suppuration of the *prevesical* space or perineum should be immediately com-

bated by free drainage. If the rent is intra-peritoneal, laparotomy must be performed, the edges of the tear closed by interrupted sutures and the abdominal wound closed except for a few strips of gauze drainage. The bladder is then drained for several days through a permanent urethral catheter by means of which it may be frequently irrigated.

Foreign bodies often gain entrance to the bladder by way of the urethra or through its walls as a result of injury. Cases of sexual perversion are frequently met with, in which the foreign body is introduced for the purpose of gratifying their sexual cravings. The ends of catheters, filiforms, etc., may break off in the bladder. Bullets, bits of shell, pieces of clothing, bone, etc., may enter the bladder. Solid articles which were swallowed accidentally have been known to pass from the intestines to the bladder by ulcerations of their walls.

SYMPTOMS.—As the article soon becomes encrusted with deposits of urinary salts, it occasions symptoms practically the same as calculi in the bladder (q. v.).

DIAGNOSIS.—Is easily made by means of the stone searcher and the cystoscope.

TREATMENT.—Usually a small suprapubic opening is necessary in extracting the foreign body unless the article be so small and brittle that it may sometimes be removed by means of a lithotrite.

TUBERCULOSIS OF THE BLADDER.

This occurs most frequently in young adults between 15 and 40 and is more common in males than in females. The mode of infection is supposed by most authorities to be secondary as a result of extension from tuberculous infiltration from the seminal vesicles or prostate, the bacilli

being conveyed by the blood current or lymphatics from the kidneys or testicle. Primary tubercle infection of the bladder is rare.

PATHOLOGY.—Tubercular deposits may often be seen early by cystoscope examination in the form of minute papules or pin head sized ulcerations and they are almost invariably found around the vesico urethral orifice and trigone or around the ureteral openings. This is soon followed by infection from the micro-organisms causing suppurative cystites and frequently ammoniacal decomposition of urine. These small ulcerative foci later in the disease become large and irregular and covered with a deposit of urinary salts and sloughing material or fungating granulations which bleed easily. The bladder walls also undergo degenerative changes in many cases and the capacity of the bladder is markedly decreased. As the process continues the cellular tissue surrounding the base of the bladder is the seat of abscesses which may slough and form fistulæ unless surgical measures are adopted.

DIAGNOSIS.—Recognition of tubercle infection must be made by urinary examination for tubercle bacilli and the cystoscopic examination of the bladder mucous membrane. A rectal examination is also necessary to ascertain the involvement of the prostate and seminal vesicles. The patient's personal and family history must also be noted.

PROGNOSIS.—Is always grave in these cases and the danger of secondary infection of the kidneys is always imminent. Recovery from tuberculosis of the bladder is very rare.

TREATMENT.—In the incipency of this infection attempt should be made to improve the vitality of the tissues and check the ravages of the disease. The patient should if possible be removed to a suitable climate. The urine should

be kept as bland as possible. The local treatment consists in careful irrigations of the bladder and instillations of creosote in liquid vaseline (10 grs. to the oz.) or iodoform emulsion. Later in the disease when the pain and frequency of urination become intolerable, morphia or codeine should be given. If the tenesmus is not relieved by opiates permanent suprapubic drainage through a fistula is advocated by many surgeons.

CHAPTER XI.

AFFECTIONS OF THE URETERS.

The ureters may be double, multiple or entirely absent; they may run an abnormal course and in some cases terminate extravasically.

The shape of the ureter varies. The calibre is not uniform but consists of a series of constrictions and dilatations thus forming a favorable seat of lodgment for calculi.

Traumatism.—Gunshot, stab wounds or general injuries during surgical operations and lacerations by unskilled use of ureteral catheters.

TREATMENT.—If the tube is more or less severed its course can be re-established by anastomosis; the ureter being exposed extra or intra-peritoneally. This is known as Van Hook's operation.

Inflammation of the ureters or **ureteritis** is caused by ascending or descending infection. **STRICTURE** of the ureters may also occur and may be treated surgically or by dilatation with bougies by means of the ureteral cystoscope.

Stone in the ureter may become impacted but usually after a violent renal colic it passes into the bladder.

DIAGNOSIS of ureteral calculi must be based on the acute onset of the renal colic. This may occlude the ureter and give rise to hydronephrosis or pyonephrosis. Catheterization will as a rule ascertain the cause. Kolischer *demonstrated* some 10 years ago that impacted calculi

can be liberated from its incarceration and brought down into the bladder by running up a ureteral catheter to the seat of the impaction and by subsequent injection of sterile olive oil.

The ureters may be sounded by introducing a wax tipped ureteral catheter (Kelly) and noting the scratches made by the stone. The combination of X-ray examination and ureteral sounding may still further refine the diagnosis. The ureteral catheter is armed with a "metallic stiletto or mandrin" and inserted into the ureter, the course of the ureter is unmistakably outlined on the skiagram. The relation of the tip of the armed catheter to the shadow of the stone will determine its location.

TREATMENT.—Hot sitz bath, hot rectal irrigations and morphia hypodermically. The bladder should be emptied by the patient or catheterization if necessary. If the stone remains impacted it must be removed surgically. Where it is loose and near the vesical outlet, the calculus may sometimes be removed, through an operative cystoscope, by means of an especially devised alligator jaw forceps.

CHAPTER XII.

NEWER AIDS TO DIAGNOSIS.

THE USE OF ENDOSCOPE.

The endoscope which was first introduced by Nitze has attained a permanent place among the modern instruments of precision, and its usefulness in aiding the diagnosis and treatment of hitherto obscure and remote lesions makes it a most invaluable adjunct to the genito-urinary armamentarium.

The instrument used for the anterior urethra may be described as consisting of a steel tube, ranging from 23 to 30 F. in calibre, with an obturator or stylet as it is sometimes called. The electric illumination is obtained either by a small 6 candlepower lamp inserted into the tube almost down to its tip or the light may be reflected from a head lamp or mirror and thus the condition of the mucous membrane at the end of the tube noted.

The pathological appearances of chronic urethritis in both the anterior and posterior urethra may be clearly revealed to the eye without the least harm or discomfort to the patient. Infection of the follicles, glands of Littre, and the lacuna magna, may be easily detected by the minute specks of exudate oozing therefrom. The mucous membrane may be explored thoroughly almost its entire length for granular and congested patches, periurethral thickening, papillomata, *œdematous* folds, foreign bodies, erosions, etc.

In the treatment of localized area of infiltration, congestion, etc., direct application thereto is greatly facilitated, thus making it an extremely useful instrument. A number of endoscopes of different manufacturers are on the market, all more or less modifications of the other.

TECHNIQUE.—The patient, having voided the urine, is placed in a recumbent posture. The endoscopic tube or canula previously sterilized is lubricated, and passed carefully into the urethra, traversing the entire anterior portion of the canal. The stylet is withdrawn and the light turned on. The funnel shape aspect of the mucous membrane is then carefully noted along its entire length as the operator gradually withdraws the instrument. Any morbid areas can be touched with nitrate of silver or copper sulphate solutions ($2\frac{1}{2}$ to 10 gr. to the oz.) applied by means of a cotton applicator. Papillomata may be seen and removed sometimes by the aid of the endoscope.

CRYOSCOPY.

Cryoscopy is employed for the purpose of determining the molecular saturation or osmotic pressure of fluids. Koranyi who was the first to apply cryoscopy clinically, has attracted considerable attention. In order to ascertain the significance of the difference in the osmotic pressure of the blood and urine, the method is invaluable as a test for renal sufficiency, and is therefore useful also as a guide for the surgeon, to determine the competency of each kidney separately, when used in conjunction with ureteral catheters.

The utility of cryoscopy depends upon ascertaining the following facts:—The freezing point with the total daily amount of urine allows us to differentiate between a simple albuminuria and albuminuria due to true kidney diseases.

Normal urine freezes between -1.2° C. and -2.3° C.

The freezing point of urine in nephritis is always higher than normal.

The freezing point of the urine from the well kidney is lower than from the diseased.

The freezing point of the blood is lower than that of the urine in nephritis.

By examination of the total amount, it is possible to differentiate parenchymatous and interstitial nephritis. Also between acute and chronic forms of the disease. In cystitis or pyelitis if the freezing point of the urine shows a diminished concentration, it may be regarded as evidence of involvement of the parenchyma of the kidneys. Concentration of the urine bears a definite relationship to the character and amount of foods taken. It is also influenced by the time after food is ingested, concentration being greatest after meals.

Where there is renal incompetency the retention in the blood of substances which should have been excreted, will cause an increased molecular concentration of the blood. Hence the freezing point of blood falls below normal when symptoms of uræmia, arise.

M. Senator confirms the results of Koranyi and thinks that the chlorides are less abundant where there is a slowed circulation, but the molecular concentration is increased.

The age of normal individuals has no influence on the freezing point of blood. In normal urine the higher the specific gravity the lower the freezing point and vice versa.

An attack of uræmia may often be foretold before any symptoms arise by means of cryoscopy, employing it daily *during the course* of the disease, observing the freezing point

of both blood and urine. By it we can differentiate between uræmic coma and that due to cerebral hemorrhage, tumor, alcoholism, epilepsy, opium poisoning and hysteria. Diabetic coma, however, cannot be differentiated with any degree of certainty and therefore must be aided by the phloridzin test.

As an aid to therapeutics, uræmia may sometimes be prevented by the early administration of energetic measures, which treatment can be instituted earlier than otherwise could be done. It will prove the efficiency of our treatment by the decreased concentration of the blood and helps to determine the advisability of venesection and transfusion in uræmia. The prognosis may be more accurately given, if we observe the freezing point of the blood and urine. If in spite of our treatment, the freezing point of blood falls and that of the urine rises, the prognosis will be grave. If on the other hand the blood shows a rise, and the freezing point of the urine falls, it proves that our efforts in the treatment have been successful and the prognosis therefore more favorable.

Casper and Richter employ both blood and urine in their work in conjunction with the methylene blue and phloridzin tests.

The steps which should be taken by the surgeon, in making an accurate diagnosis, previous to operations on the kidney, according to Rumpel, are as follows:

1. Cystoscopic examination of the bladder and ureteral openings.
2. Ureteral catheterization (bilateral).
3. Cryoscopic examination of the separately obtained urines.
4. Cryoscopic examination of the blood.

5. Phloridzin injection and estimation of the excreted sugar.

6. Methylene-blue elimination after intramuscular injection.

A chemic and microscopic examination should supplement the above measures.

The apparatus devised by Beckman consists of the following parts:

1. A glass jar 5x7 ins. fitted with a metal top, having four openings for the tubes, thermometers, etc.

2. A test-tube 6x1½ ins. known as the "air tube." Inside of this is fitted the tube for liquids, having a side arm, known as the "inside tube," fitted with perforated rubber stoppers.

3. Standard thermometer, Heidenhain model, graduated in .01° C., the scale registering from —.5° C. to 50° C.

4. Small thermometer graduated in 1° C.; scale from —10° C., to regulate the temperature of the bath.

5. One large stirrer for salt and ice mixture; one smaller for liquid to be frozen.

6. One cooling tube for cooling liquids before freezing.

The glass jar is nearly filled with a mixture of cracked ice, salt and water, and the parts adjusted. The specimen to be frozen is poured from the cooling tube into the inside tube (which must be clean and dry) until the mercury bulb of the large thermometer is immersed in the fluid. The tube is now placed in the "air tube," constantly stirred until the process is completed.

If blood is to be frozen, it is obtained from one of the superficial veins of the arm in the usual manner, and preferably frozen immediately but may be safely kept on ice for 12 hours.

The TECHNIQUE is most important, therefore to be accurate observe the following points:

1. Test the thermometer before using, in freezing distilled water which should freeze at the zero mark.
2. Stir constantly until the process is completed.
3. The mercury bulb of the thermometer must be entirely emersed in the fluid to be frozen and must not touch the bottom of the inside tube.
4. The specimens of blood and urine must be frozen before any decomposition occurs.
5. Do not use any preservatives in the specimen to be examined.
6. Keep the tubes well corked and work quickly.
7. The temperature of the bath should not be below -2.5° C. to 3° C.
8. The inside tube must be absolutely clean and dry previously to its use.
9. Do not work in the sunlight or where there are draughts.

ROENTGEN DIAGNOSIS OF LITHIASIS OF THE URINARY TRACT.

Lumbar exploration and similar procedures for suspected nephrolithiasis are no longer in order, since the Roentgen method not only shows whether or not any calculi are present, but giving precise information as to their size, shape, and number. It will also show whether there are any calculi in the ureter or bladder. The X-ray will invariably reveal the presence of renal or vesical calculi—provided the calculus is present.

The chemical composition of the calculi of the urinary tract determines the greater or lesser depth of their shadows.

The greater their atomic weight, the greater their density and consequently the more distinct shadows. Thus calculi composed of oxalate of lime show the most distinct shadows. Their shadows are even deeper than those of bone tissue. Next to them we find those consisting of phosphate of lime, while the uric acid calculi give the faintest shadows.

Calculi are not of one distinct type, therefore, layers of various degrees of density are observed. Two types are generally present, then one or the other character predominates. It frequently happens that there is a nucleus of uric acid surrounded by alternate layers of the other elements. This explains why some dense areas are found in all cases of renal calculus; the same is true when the calculi are of small size. The question of composition, however, is of less importance than that of bringing the calculous area as near to the plate as possible, and keeping the field absolutely quiet.

The modern skiagraphic apparatus consists of a tubular diaphragm which has the advantage of permitting the passage of only the focal rays, and showing a small area at a time. A general exposure therefore must precede that of a limited area. The time of exposure should be three minutes in thin and five or six minutes in stout individuals. Usually, the longer the exposure lasts the clearer will the bones show and the less marked will be the calculi. The same general principles apply to the skiagraphy of the urinary bladder. The patient should be in a recumbent position, and the centre of the tube directed to the upper margin of the symphysis. The coccyx should show well, but the sacrum give no details. An oblique exposure should also be made, as it may show whether the stone is free or encysted. For showing numbers and position of calculi the Roentgen method is far superior to the cystoscope and it is

much more pleasant for the patient. Skiagraphy of the renal regions is always necessary when vesical calculus is suspected, because there is often found a renal calculus with one in the bladder. This explains the common recurrence of vesical calculus after an operation.

The combination of X-ray examination and ureteral sounding is another step in refining the diagnosis. If a ureteral catheter armed with a metallic stiletto or mandrin is inserted into the ureter, the course of the ureter is unmistakably outlined on the skiagram. The advantages of the appearance of this shadow on the X-ray picture are obvious. The relation of the ureteral shadow to that of a tumor of doubtful nature will tell whether this tumor is of renal origin and if the shadows of supposed ureteral calculi are not in intimate connection with the ureteral shadow, the erroneous diagnosis will be corrected. The relation of the tip of the armed catheter to the shadow of a renal stone will determine whether the stone is lodged in the renal pelvis or in the parenchyma of the kidney. In plastic operations on the upper end of the ureter or on the renal pelvis, a ureteral catheter, inserted previous to the operation, will, as a rule, be a very helpful guide.

CYSTOSCOPY AND URETERAL CATHETERIZATION.

The direct ocular examination of the interior of the urinary bladder by means of the cystoscope, was first placed on a practical and generally acceptable basis by Nitze and is now one of the firmly established aids in surgery for exploration and diagnosis of the bladder and ureters as well as the prognosis and treatment of pathological conditions of the kidneys.



FIG. 55.



FIG. 56.



FIG. 57.



FIG. 58.



FIG. 59.



FIG. 60.



FIG. 61.



FIG. 62.

CYSTOSCOPIC VIEWS.

Cystitis has become classified so that at the present time, desquamative catarrh, gonorrhœal cystitis, tuberculous cystitis, and various other types are well defined in their pathological, clinical, and cystoscopic characteristics. The knowledge that obstinate cystitis might be obtained by torpid ulcerations is one of the achievements of cystoscopy. We get information as to the relations and the size of the growth. The cystoscope will usually detect a vesical calculus, and at the same time will give full information as to the nature of the stone, its size and location, and whether the stone is free or partially encysted. By the same exploration, the condition of the bladder wall can be determined, and in deciding upon the choice of operation, it is also a valuable aid.

Cystoscopic examination will furnish information in prostatic disturbances. The surgeon is thereby enabled to decide intelligently upon the operation to employ in order to relieve prostatic obstruction.

The cystoscope tells whether pus or blood is coming from the prostate or from the bladder proper, or whether these pathological secretions come down from the kidneys. Diverticula, so often a cause of great distress to the patient, can be successfully removed after having been diagnosed through the cystoscope.

Endovesical operations may be performed through an operative cystoscope and applications made to ulcerative lesions.

The condition of the ureteral orifices can be ascertained. A gaping, or injected ureteral mouth indicates, almost invariably, some pathological condition in the kidney.

Impacted ureteral calculi have been seen half-way out of the ureteral opening and the operative cystoscope relieved this condition.

Catheterization and sounding of the ureters has become a comparatively simple procedure. A sound introduced into the ureter will give information as to the patulence of this tube; it will permit one to locate the seat of an obstruction. The scratches on the wax-tipped catheter of Kelly will corroborate the presence of ureteral calculi. Kolischer first demonstrated that an impacted ureteral stone can be liberated from its incarceration and brought down into the bladder by running up a ureteral catheter to the seat of impaction and by subsequent injection of oil.

The combination of X-ray examination and ureteral sounding is another step made possible by cystoscopy. (See chapter on X-ray lithiasis.)

In plastic operations on the upper end of the ureter, or on the renal pelvis, ureteral catheterization performed previous to the operation is a valuable guide to the surgeon.

There are two kinds of cystoscopes that are of particular value, one fitted with prismatic lens, the other with direct vision lens. The former causes an inverted image, and is therefore a more complex instrument. Winfield Ayres has devised a very excellent cystoscope. This is constructed with direct vision lens, and allows a wide view of the bladder wall and ureteral openings. (Fig. 63.)

The telescope and catheter tubes are made in one portion and are independent of the lamp carrying part, and fit into it after the mantle is removed. After the instrument is passed, the bladder may be filled, or irrigated, directly through the barrel of the cystoscope.

The **TECHNIQUE** is as follows: The instrument should be sterilized by immersing it for five minutes in a solution of mercury oxycyanide 1 to 1000, or formalin 1 to 500. The *mercury oxycyanide* solution is preferable to the formalin,

as it is non-irritating to the hands, or to the mucous membranes, and has no deteriorating action on metal instruments

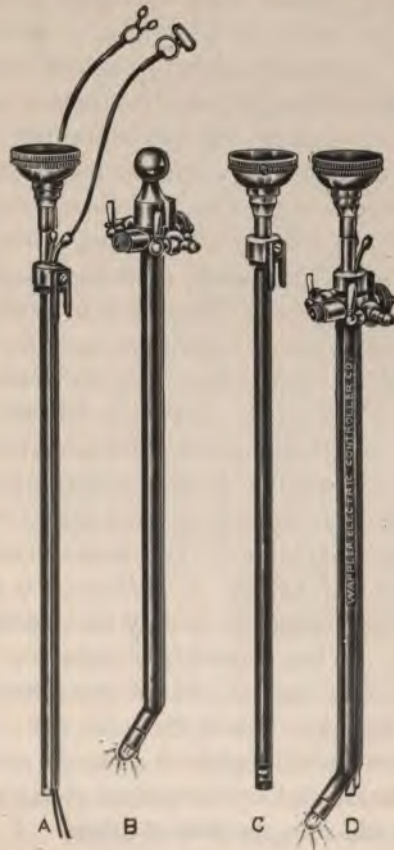


FIG. 63.—Tilden-Brown Cystoscope. A. Direct lens system. B. Obturator in position. C. Retrograde lens system. D. Direct lens system in position.

or on the ureteral catheters. In the male, the glans penis should be rendered sterile, and the same care exercised

the female, by cleansing the vulva and urethral orifice. The hands of the operator should also be sterilized.

The patient is placed upon the table in the lithotomy position with the hips slightly elevated, to prevent the fluid escaping from the bladder along the side of the instrument. The lamp should always be tested just before using it. The instrument is now taken and well lubricated with lubrichondrin or any other soluble lubricant, and passed gently into the urethra, as one does with an ordinary sound, until the prostatic urethra is reached, when owing to the short beak, the outer end of the instrument must be brought well down between the thighs, which will allow it to enter the bladder easily. The canula is now withdrawn, and the bladder filled directly through the barrel with oxycyanide solution 1 to 5000, and about 8 to 10 ounces left in the bladder during the examination. The telescope and catheters are inserted, the current turned on, and the bladder illuminated. The instrument should be tilted carefully in all directions; drawn slowly back and forth, when the ureteral orifices will usually appear as small oblique slits, cavities, or small papular prominences, or sometimes they cannot be readily seen until they emit a spurt of urine. When located the catheters are carefully inserted and gently pushed upward until the tip is in the pelvis of the kidney. Should the urine fail to flow, it may simply be due to a small bubble of air in the catheter. This may usually be expelled by the patient giving a few violent coughs, which will start the flow of urine.

The instrument may now be removed and the catheters left in place, thus allowing the urine to be drawn from the separate kidneys, which is collected in two sterilized bottles for the purpose of microscopic examination and chemical analysis. If the catheters are of two different colors, it can

be readily discerned which drains the right and which the left kidney.

Inflammatory conditions of the ureters may be diagnosed from the microscopic findings. Catarrhal pyelitis is evidenced when the microscope shows epithelial cells from the renal pelvis, either superficial or deep, with the presence of little or no pus and mucus. Purulent inflammations of the kidney may also be differentiated.

Lavage treatment of lesions in the pelvis of the kidney, through the ureteral catheter, is now practised by many surgeons with good results. A glass syringe of about 100 cc. capacity is fitted with a needle which will pass into the end of the catheter; then with gentle pressure not more than 5 or 10 cc. should be injected at a time and this allowed to run out before it is repeated. If a larger amount is given there is danger of it causing considerable pain, but after a few treatments the amount can be gradually increased. Should the injection give rise to the least pain, the pelvis must be allowed to empty itself immediately, before repeating the injection.

A solution of 1 to 8000 of silver nitrate in a saturated solution of boric acid should be used at the first treatment, but the strength may be gradually increased up to 1 to 2000 or even 1 to 1000 in successive treatments. In purulent cases it may be used much stronger, from 1 to 1000, to 1 to 500. These solutions should be given at the temperature of about 100 F. Upon withdrawing the catheters the injection is continued, irrigating the entire length of the ureters. After the patient has emptied his bladder, the urethra and bladder should be irrigated with a solution of silver nitrate about 1 to 5000 in strength. Strictures of the ureters are occasionally met by the failure of ordinary sized catheters

to pass upward into the pelvis. No. 4 or 5, French, is about the proper size to use. It must be remembered that the lumen of the ureter is slightly constricted at three points; a muscular constriction at the entrance of the bladder; another where the ureter passes over the brim of the pelvis; and a distinct narrowing about an inch from the pelvis of the kidney.

Methylene blue has also been used as a test to depend on coloring matter passed. In healthy kidneys urine may be seen coming from the ureters by means of the cystoscope. The severer the infection, the slower it is excreted. The value of this test as to the competency of the kidneys is questioned by many authors.

Phloridzin test.—The use of phloridzin in testing the functional activity of a suspected diseased kidney was first employed by Klemperer. The method consists in a subcutaneous injection of 0.005 gm. of phloridzin which produces a temporary glycosuria depending for its amount upon the activity of the renal parenchyma. The secretion from each kidney is collected separately by means of ureteral catheterization. The changes in each are noted and the amount of sugar contained in the separated urine is compared.

The **urine segregator** is another useful aid to diagnosis, but its field of application is more limited than that of the cystoscope. There are several kinds of segregators, the best of which are the Harris and the Cathelin instruments. The Harris instrument raises the posterior wall of the bladder into a longitudinal fold forming a water shed between the ureteral orifice, whereas the Cathelin segregator attempts to form a water-tight septum within the bladder, but when the viscus is empty, a water-tight partition is practically impossible, owing to the folds in the mucous membrane.

The use of the segregator is only indicated where the diagnosis of renal impairment is desired, and not to be used in cases of diseased bladder. A cystoscopic examination therefore should always precede an attempt to segregate the urines.

CHAPTER XIII.

THE CHANCROID.

Synonyms.—It has been variously termed soft chancre, non-infecting sore, simple, non-indurated, or non-syphilitic chancre.

Definition.—The chancroid is a simple infectious ulcer occurring usually on or about the genitalia. It is destructive in its tendencies but under ordinary circumstances is a cutaneous lesion involving the superficial structures only, and is not followed by any constitutional manifestations.

Its *secretion* is purulent in character, highly infectious and is usually the vehicle of chancroidal contagion. An interesting feature is that the chancroid is auto-inoculable, and that animals are not immune to it.

The mode of infection is generally from contact, which occurs most often in the act of coitus. It is acquired, therefore, by direct contagion, and very rarely in any other way. The seat of the inoculation is favored by a loss of continuity in the tissues, e.g., an abrasion, chafes, erosions, herpes, etc.

The chancroid is distinctly venereal, hence, its **source** of origin is easily assigned. It often begins as a simple inflammatory lesion, which very soon becomes the seat of pyogenic infection, resulting in a typical septic ulcer. The lymphatic glands in intimate anatomical relation to the *chancroid* are very frequently involved, resulting in the

so-called chancroidal *bubo*. When there is a co-existent initial lesion the sore becomes a favorable nidus for pyogenic invasion. This condition is then known as the mixed chancre or mixed infection.

The BACTERIOLOGY of the chancroid has made decided advance toward discovering the causal factor. But even at the best it is still indefinite. Much credence has been placed in the claims of Ducrey and Unna who claim to have succeeded in isolating the specific micro-organism which is known as the strepto bacillus of Ducrey-Unna. These organisms have been found in both the pus and the tissue of chancroids and also from accompanying buboes. The culture media used was uncoagulated rabbit's blood serum, and later blood agar.

Site.—The inner tegument of the mucous membrane of the prepuce is most commonly the seat of chancroids, but they may be seen on any portion of the genitalia, e.g., corona sulcus, frenum, shaft of penis, lips of meatus (rare), and when from auto-inoculation, it may occur on the scrotum, thighs, pubis and anus.

In females they are most commonly found on the fourchette, vestibule, clitoris, labia minora, labia majora, on the os uteri, and when from auto-inoculation, upon the perineum, thighs, and pubis; and sometimes the anus. Chancroids of the vagina and os uteri are very rare, but may be occasionally found.

Varieties—Single, multiple, phagedenic, and serpiginous.

Complications may be phimosis, paraphimosis, lymphangitis, lymphadenitis (bubo), vegetations, phagedena, gangrene, mixed infection, balanitis and balano-posthitis.

The period of incubation of chancroids is one to seven days with an average of twenty-four to forty-eight hours.

Inflammatory symptoms at the point of the inoculation begin very early. Usually within twenty-four hours a pustule appears which in one or two days will be seen to have a distinct red areola surrounding its base. Within a week this undergoes ulcerative changes, the discharge is purulent, the sore painful, but has no indurated base. The outline of the ulcer may be round or oval, even or irregular. Its base paunched out in appearance, the floor being uneven, and covered with a pseudo-membrane.

The duration is indefinite and depends largely upon the treatment, hygiene and habits of the patient.

The conditions which are commonly confounded in making a **diagnosis** of chancroids are: chancre, herpes, eczema, balanitis, simple ulcers, abrasions, or excoriations. Chancroid may be distinguished from chancre by its rapid development, its situation, character of the secretion, absence of induration, period of incubation, and its tendency to multiplicity.

DIFFERENTIAL DIAGNOSIS OF CHANCROID AND CHANCRE.

Chancre.

Lesion of a constitutional disease. First stage of syphilis.

Due to syphilitic infection, may be by contact with chancre.

May occur on any part of the body.

Period of incubation from 10 days to 10 weeks (usually 3 weeks is an average).

Base indurated.

Little inflammation around sore.

Nearly always single.

It is inoculable but not auto-inoculable, except in mixed infection.

Secretion thin and scanty unless irritated.

Sore is attended with little or no pain.

Edges sloping and not undermined.

Polyganglionic bubo, painless (rarely suppurates). Never furnishes inoculable pus.

Scanty serous secretion.

Begins as papules.

Tendency to heal rapidly.

Phagedena is very rarely seen.

Chancroid.

Local disease, not followed by secondary symptoms.

Due to contact with secretions of sore of same nature (chancroid).

Nearly always occurs on genitals, rarely extra-genital.

Period of incubation less than 10 days.

Base not indurated as a rule, unless deeply cauterized or irritated.

Considerable inflammation around sore.

Generally multiple.

Auto-inoculable.

Secretion purulent and profuse, hemorrhagic and often offensive in odor.

Sore is painful.

Edges undermined.

Monoganglionic, painful bubo, which suppurates, forming inoculable pus.

Copious purulent secretion.

Begins as pustules.

Tendency to spread.

In chancroid phagedena occurs frequently in neglected cases.

From HERPES chancroid may be recognized by the former usually appearing on the glans, penis, and prepuce, as small vesicles occurring in groups, setting closely together, light in color, and resting on a florid base. In ECZEMA these

vesicles are more minute and diffused than in herpes. There is generally greater local irritation, the parts being swollen and painful, itching and burning.

In **BALANITIS** the inflammation is usually widely diffused, the discharge very profuse, and the involvement is not circumscribed.

CHANCROIDAL BUBO.

Strictly speaking the bubo simply consists of an adenitis or lymphangitis occurring from any cause, but clinically it is restricted to an inflammation of the inguinal ganglia and perivascular tissues which accompanies a venereal sore or gonorrhœa. It may however occur from any irritating or suppurating process on any part of the lower extremities. **CHANCROIDAL BUBO** is an enlargement of the inguinal or crural lymphatic glands (or both) and usually occurs during the existence of the lesion, as a result of absorption of its poisonous secretion.

The **SYMPTOMS** are at first inflammatory; with tenderness, pain, swelling, and discoloration. Later the process undergoes typical abscess formation or suppuration.

Chancroidal bubo usually occurs on the same side as the sore, and is as a rule limited to one, but sometimes, though seldom, it involves two glands, rarely more. It runs its course rapidly and may or may not be accompanied with constitutional disturbances. Should the suppurating condition result in sloughing of its covering, it is referred to as an ulcerating bubo.

INDOLENT bubo occurs in persons of debilitated and scrofulous constitution. After having made a certain amount of progress, the enlarged glands may remain stationary

for some time, neither advancing nor receding. Sooner or later resolution or suppuration occurs.

SYPHILITIC BUBO.

As a rule involves several glands.

Most commonly bilateral or symmetrical.

Usually occurs soon after the lesion appears.

In size the glands are about as large as a pea or a little larger.

Inflammatory symptoms not present in uncomplicated cases.

Rarely suppurates save in mixed infection.

Pain and tenderness will be absent or less severe.

CHANCROIDAL BUBO.

Usually involves one gland, rarely more than two.

May be bilateral but more commonly unilateral.

May occur at any time during the existence of the lesion or soon after healing.

Vary in size may become large as a lemon.

Inflammatory symptoms are marked.

Usually terminates in suppuration.

Pain and tenderness often well marked.

Treatment of buboes.—Where there is a simple adenitis, resolution might be induced by the patient being put at rest in a recumbent posture, and the application of hot or cold fomentations, and lead water and laudanum to the part. Firm compression of the groin with a spica-bandage is often efficient. Sometimes counterirritants such as tincture of iodine applications will be found beneficial.

Abortive methods.—In the early stage of inflammatory buboes, Horwitz advocates interstitial hypodermic injections of carbolic acid solution (8 gr. to the oz.) injecting about $\frac{1}{2}$ dram into different portions of the glandular substance. The effect is then further enhanced by firm compression with a gauze pad held in place by a spica-bandage, and the patient put at rest. Should these measures fail and there are distinct signs of fluctuation present, indicating the presence of pus, the part should be shaved and rendered aseptic. A small incision about $\frac{1}{4}$ of an inch in length is made, and the pus evacuated. The abscess cavity should

then be washed out with sublimate solution (1-5000), introduced by means of a hand syringe, and then one or two syringefuls of peroxide of hydrogen injected. This is again followed by the sublimate washings until the solution comes away clean. An ointment consisting of 10 per cent. solution of iodoform in vaseline is softened by heat and drawn into a syringe and injected until the abscess cavity is filled. This is congealed by holding a piece of ice over the mass. The opening is then closed with a thin layer of absorbent cotton, held in place by collodion. The groin may be bandaged and the patient kept at rest in bed for the first few days. It is well to advise continuing with ice over the part, keeping the iodoform ointment constantly caked, and incidentally promoting resolution.

Should the suppurating process still persist, RADICAL OPERATIVE TREATMENT is the only effective means of its termination. This consists in making a free incision over the affected area which has been previously rendered sterile, followed by a partial or complete excision of the diseased glands and a curettement of the surface, and then touching the floor of the cavity with carbolic acid, packing it with iodoform gauze, and allowing it to heal by granulation. Subsequent treatment of the wound consists of bichloride irrigations (1-5000) and stimulated with dressings of balsam of peru gauze, or ointment. The formula of the latter is as follows:

R _x	
Balsam peru	3i
Calomel	3ii
Ung. zinci oxidi q. s. ad.	3i

The formation of any exuberant granulations should be *combated* by applications of nitrate of silver pencil. The

wound should be dressed daily until granulations have begun, and then dressed every other day.

TREATMENT OF CHANCROID.

This must naturally depend on the character of the lesion, but the principles, and the general management of the various conditions, remain practically the same. First of all the insistence of absolute cleanliness on the part of the patient is necessary. This is best accomplished by prescribing frequent baths or washings of the part with tincture of green soap and warm water, then immersing it in either warm normal salt solution, potassium permanganate (1-3000), bichloride (1-3000), or boric acid. In fact any of the mild antiseptics may be used for this purpose. The sore should then be sprayed with peroxide of hydrogen, so as to disintegrate the desiccated blood and pus. In patients where the chancroidal ulcer remains localized and superficial, with a thin purulent film covering its floor, the treatment must be directed at first to destroying the covering, by the use of carbolic acid gently applied over the area with a small piece of absorbent cotton wrapped around the end of a tooth-pick or wire applicator. Nitric acid (25 or 50 per cent.) may also be used, or the acid nitrate of mercury solution (1-10). Previous to the application of either of these two agents, it is best to anæsthetize the area with a solution of cocaine as strong as 10 per cent. freshly made. Nitrate of silver should never be used on any venereal lesion, by reason of the area of induration it usually produces. But if a stimulating effect is desired, a 2 or 3 per cent. solution of copper sulphate answers this purpose admirably. Should the floor of the ulcer then appear clean and covered with healthy granulations, cauterizations should be abandoned.

ordinary stimulating lotions or dusting powders used. Should complications develop they must be treated accordingly. If there be much œdema, a gauze dressing saturated with lead water and laudanum and wrapped around the part will be usually found effective. The treatment of these lesions when occurring in the female, is practically the same. It is always well to interpose some absorbent cotton, preventing the healthy parts from coming in contact. Probably the most efficient all around dressing to ordinary chancroids is black wash (Lotion Nigra) applied on a thin film of cotton and kept continuously moist. Where the lesion presents more virulent tendencies, iodoform is the agent par excellence. Both these have the combined effect of sedative and stimulating properties. The iodoform may be combined with sub-nitrate of bismuth, boric acid, etc. Curettement of chancroid is sometimes indicated when its tendency is to become serpiginous and obstinate.

The local TREATMENT OF PHAGEDENIC CHANCROIDS must be supplemented by tonic stimulants, and the pain relieved by opiates. The phagedenic process must be checked. Sometimes it will be necessary to resort to the curette, afterwards touching the base with nitric acid or the actual cautery. If its situation is subpreputial and is attended with phimosis, it must be rendered accessible by an immediate dorsal incision of the overlying tissues extending back as far as the sulcus on the median line.

The TREATMENT OF CHANCROIDAL PARAPHIMOSIS consists in either attempting to reduce the retracted prepuce manually. Where this fails, surgical intervention is urgently necessary. The constricting ring must be completely divided to relieve the strangulation. This incision is also made in the median *line on the dorsal surface* (see chapter on phimosis and *paraphimosis*).

CHAPTER XIV.

SYPHILIS.

Synonyms: Lues venera; pox; morbus gallicus, etc.

Definition.—Syphilis is a general chronic infectious disease, affecting the entire economy, characterized by local manifestations and adenopathy. It is classed with the infectious granulomata such as tuberculosis, glanders, and leprosy.

General Considerations.—Syphilis begins as a local lesion at the point where the virus has gained entrance to the system through contact, which medium may be direct or indirect with a syphilitic person. In its incipiency, or the first period of incubation of syphilis, there may or may not be constitutional disturbances, e.g., rigors, fevers, malaise, anorexia, anæmia, headaches, rheumatoid pains, and albuminuria. These morbid phenomena together with cutaneous eruption strongly resemble the exanthemata, particularly diphtheria and small-pox.

The two forms of syphilitic infection are: the *acquired* and *hereditary* forms.

Acquired syphilis begins as a local lesion or the chancre, but in hereditary syphilis, there is no initial lesion, the disease beginning with general manifestations. Syphilis may be genital or extra genital in its origin.

The former occurs from *sexual contact* with a person in whom the disease is present. The latter originates from

sources, e.g., kissing a syphilitic, examination of syphilitics by physicians, etc., also from *contact with some article* which has been contaminated with the secretions of a syphilitic individual. In this form of syphilis the site of the initial lesion is extra genital. This type of infection was termed by Bulkley, "Syphilitic Insontium," or syphilis of the innocents.

Hereditary syphilis is derived from one or both parents in whom the disease had been present at the time of conception.

Immunity.—All animals excepting the ape are immune to syphilis, this having been proved by careful experiments, therefore, it is a disease from which mankind alone suffers. Metchnikoff and Roux have recently succeeded in inoculating ten chimpanzees with syphilitic virus from the primary and secondary lesions, and have obtained positive results in every case. A person who has been once infected with syphilis may ordinarily be considered immune to subsequent infection of the disease, although this rule is not without exception.

Etiology of syphilis.—Until recently the specific organism of syphilis had not yet been isolated, and in fact the entire bacteriology of this disease was altogether unsettled, as to the exact causative factor. Various investigators had found organisms, claiming them to be specific. These were obtained in smears or secretions of the various lesions and infected tissues, at different stages of the disease.

The most recent observation upon the causative factor of syphilis, has been made by Schaudin and Hoffman, who claim to have found quite constantly in primary and secondary lesions of the disease, a spirochæta, which owing to its *characteristic refractivity to stains*, they have called, the

spirochæta pallida. Some observers who have found the same organism quite as constantly as the above, propose the name *treponema pallidum*. The discovery of the spirochæta pallida, however, has probably been given more

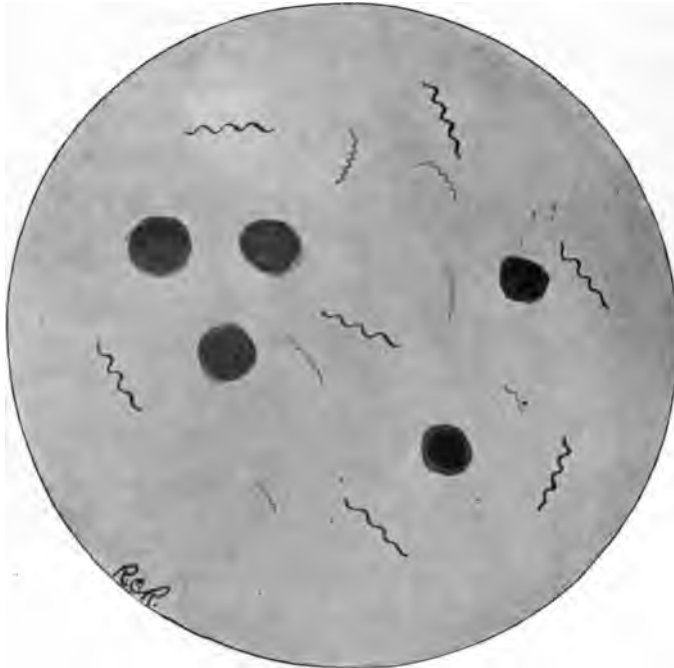


FIG. 64.—The SPIROCHÆTA REFRINGENS is the larger and more darkly stained organism, while the lightly stained and more delicate parasite is the SPIROCHÆTA PALLIDA. (*treponema pallidum*.) (From a chancre stained with Wright's blood stain.) (Rosenberger.)

credence than any of the hitherto alleged specific organisms of syphilis. It has likewise been found and confirmed by the best authorities the world over.

The parasite is an extremely delicate wavy spiral ~~for~~

4 to 14 μ . in length with decidedly pointed ends and having from 3 to 8 curves. In the fresh condition it is seen to be actively motile.

Associated with the organism in nearly all the lesions is another larger, more darkly staining spiral, called the *SPIROCHÆTA REFRINGENS*, which has been found in other lesions than those of syphilis. The probability that this organism (the *spirochæta pallida*) is the causative factor of the disease, is strengthened by the fact that a number of observers have demonstrated its presence in the blood and organs of congenitally infected children.

For a demonstration of the organism, a spread is made upon a cover glass from a chancre, mucous patch, or from the serum obtained from the eruption and dried. It is then stained with Wright's stain, or what is better, Giemsa's azure blue solution.

With the latter, fixation of the spread must be facilitated with absolute alcohol for 15 to 30 minutes, the stain applied for from 30 min. to 24 hours, washed in water, dried and examined with a 1-12 inch oil immersion lens.

With Wright's stain, it can be demonstrated by applying the dye in exactly the same manner as for staining a film of blood.

By either method the organism is decidedly pale blue, while the *spirochæta refringens* is deep purple. In most preparations from the lesions, but one or two *spirochæta pallida* are found, while the *spirochæta refringens* may be relatively numerous.

In considering the cause of syphilis in the present state of our knowledge, it may be best to leaven our belief in this *latest discovery* with a proper amount of conservatism.

CHANGES OF THE BLOOD IN SYPHILIS.—In all stages of

sypilis there is more or less of a reduction in the number of red cells, and a consequent diminution in the hæmoglobin, which may be transitory or permanent. In some cases, however, there may be no changes at all detected.

Lymphocytosis in various degrees is an almost constant condition. The effect of the disease upon the blood usually depends upon the severity and the duration of the symptoms.

ACQUIRED SYPHILIS.

Ricord divided the disease into three stages, the *primary*, *secondary*, and the *tertiary periods*.

Primary sypilis consists of two PERIODS OF INCUBATION.

The first constitutes the time which elapses between the date of the beginning of the infection, and the appearance of the primary lesion. The second is the interval between the appearance of the initial lesion, and the secondary manifestations. The first period may last from 10 to 98 days with an average of 21 days. The second period of incubation lasts usually about six weeks, but may vary from four to twelve weeks in its duration. These two periods constitute the primary stage. In other words, from the date of the infecting coitus, to the appearance of the secondary manifestations constitutes the first or primary stage of sypilis.

The interesting morbid phenomena observed during this stage are, the evolution of the initial lesion, and enlargement of the lymphatics in anatomical relation to it. These may be distinctly palpated, usually in from the seventh to the tenth day after the appearance of the chancre. At the end of the second period of incubation with the appearance of the secondary manifestations, the disease may be said to be

fully developed, and from that time on the **secondary stage** begins.

Tertiary syphilis is the third or last period of the disease and comprises the destructive syphilitic processes of these structures as well as the deep tissues of the viscera.

Prognosis.—The virulence of syphilitic processes is always most doubtful and depends largely on the resisting power and habits of the individual. It is accordingly upon this, that the prognosis must be based.

The conditions which may considerably complicate the treatment of syphilis, when they co-exist, are: tuberculosis, alcoholism, old age, cancer, jaundice, malaise, diabetes, albuminuria, nephritis, gout and rheumatism, and any of the acute infectious diseases, e.g., typhoid fever, diphtheria, anæmia, and small-pox. (Taylor.)

Vehicles of infection.—The sources of infection other than the genitalia, may be any vehicle which has been contaminated by a syphilitic person. Most commonly the disease is derived from the secretions of the initial lesion, condylomata and the mucous patches, etc., when they are either genital or extra genital. The virulency of the secretions of pustules, papules, and tubercles, are also prolific sources of contagion. The virus brought into contact with a non-syphilitic person may give rise to an initial lesion, at a point of abrasion or other solution of continuity anywhere about the body.

(While the secretions of the secondary lesions are highly infectious, the same is not true of the tertiary. The semen of a man in the secondary stage is not infectious on the mucous membrane of the woman, but should conception take place the disease is most likely to be transmitted.)

When the disease is communicated by means of utensils,

toilet articles, instruments, etc., it is acquired by mediate infection. The lips, gums, mouth, nose, and eye-lids are the parts most commonly affected. Cigars, tooth-powders, tooth-brushes, pipes, cigarette and cigar holders, drinking and eating utensils, razors, towels, sponges, linen, masks, wearing apparel, wash rags, pins, needles, children's toys, nursing bottles, surgical, dental and manicure instruments, syringes, paper cutters, lead pencils, telephone mouth pieces, musical instruments, and whistles are some of the mediums of conveying syphilitic virus.

Modes of infection.—Direct and indirect or mediate contact and by inheritance.

Most commonly, however, the disease is acquired by direct contact. The sexual act is the most frequent mode of its communication, but it may be also transmitted by acts of sexual perversion. In these instances the chancre is usually extra genital. The lesions and secretions which are contagious have already been enumerated, but the means of their conveyance may be summarized as follows: kissing; nursing babies; bites from infected persons; surgeons; nurses; and mid-wives; incidental to examination or treatment, or in operating upon syphilitic persons, skin grafting, and tattooing. (Taylor.) Dentists may contract syphilis from lesions of the mouth of infected patients, or may convey the disease to many persons by means of instruments smeared with syphilitic secretion. Vaccination has been the means of transmitting syphilis, due to soiled instruments or hands.

CHAPTER XV.

PRIMARY SYPHILIS.

Primary syphilis, or the first stage, consists principally of the initial lesion, or chancre, and an associated lymphatic enlargement.

CHANCRE.

SYNONYMS.—Syphilitic chancre, primary lesion, initial lesion, primary sclerosis, hard chancre, infecting chancre.

The initial lesion is the best of these various synonyms and the most appropriate, as the term implies it to be the first manifestation of the infection.

The first PERIOD OF INCUBATION ends with the appearance of the initial lesion.

SITE.—May be *genital* or *extra genital*. May occur on any part of the body, distinguishing it therefore, particularly, from the chancroid. It is very frequently found at the corona sulcus, the margin of the prepuce, the frenum, meatus urinarius, glans penis, the tegument or shaft of the penis, scrotum, the perineum, and anus. In women, genital chancres appear most frequently in the following order: the labia majora, and minora, fourchette, the cervix, clitoris, and meatus urinarius. Chancres of the vagina are very rare but when they do occur they usually escape diagnosis, on account of it being a comparatively painless lesion. A very important feature of the genital chancre in women, is that the inguinal glands are as a rule not involved.

The *extra genital chancres* are most frequently seen on the lips, fingers, nipples, anus, tonsils, tongue, nares, alæ of the nose, thighs, arms, and toes. Initial lesions are usually solitary but may be found multiple, though rarely.

Other conditions which must not be lost sight of in establishing an accurate diagnosis of a genital chancre are: chancroids, abrasions, herpes, proagenitalis, and scabies.

Apart from the genitalia, the lips are the most frequent seat of the extra genital chancre. As chancroids are rarely if ever extra genital, the most common disease with which chancre may be confounded is epithelioma on the lip, a differential diagnosis of which is as follows:

Initial Lesion.	Epithelioma.
Rapid in its onset.	Gradual in its development.
Duration limited.	No duration.
Induration marked and well defined.	Induration diffused.
Submaxillary adenitis, but not painful.	Submaxillary glands inflamed.
Involvement of the glands is rapid.	Involvement of glands delayed.
Initial lesion may occur in any age or sex.	Only occurs after middle life or in old age, most often in male sex, pipe smokers especially.
Is more or less painful.	Epithelioma not painful.
Swelling very marked.	Swelling not so marked.
Microscopic examination negative.	Microscopic examination of a section will reveal its nature.

THE PERIOD OF INCUBATION of the chancre varies from 10 to 98 days, with an average of 21 days.

INDURATION OF CHANCRES.—This is one of its constant distinguishing features and is easily recognized by the sense of touch. The sclerosis or character of its induration may be *annular, nodular, parchment* or *laminated*.

DURATION.—Always undefined, as it varies considerably.

The lesion may last anywhere from a few days to several weeks—and sometimes persist even for several months. The lesion usually disappears, however, with the onset of the secondary manifestations. Should they last beyond this, the specific constitutional treatment will usually hasten their resolution.

DIAGNOSIS.—The principal diagnostic features of the chancre are (a) its period of incubation, (b) the character if its induration, (c) and the accompanying enlargement of the adjacent lymphatics.

VARIETIES OF INITIAL LESION:

Superficial erosion.	Umbilicated or follicular.
Superficial ulceration.	Multiple herpetiform (Dubuc).
Papular.	Infective balanoposthitis (Mauriac).
Deep ulcerative or Hunterian.	Mixed infection.
Silver spot (Taylor).	

The superficial erosion is the commonest variety of the initial lesions but yet very often over-looked. It is superficial, roundish or oval in shape, and has a smooth surface resting on a parchment bed of induration. It may be dry or slightly moist with a thin serous secretion.

The superficial ulcerative variety have an irregular outline with sloping edges, slightly elevated, sometimes resembling a fissure. This also rests upon a thin layer of induration.

The papular chancre is non-ulcerating, indurated at its base, dry, and scaling, and usually occurs on skin surfaces at the point of the inoculation.

Deep ulcerative or Hunterian chancre rests on a large area of induration. It is craterform, or scooped out in its appearance, very irregular in its shape, its floor representing a deep fissure. The edges are sloping, and markedly

indurated. This type varies in size, but may be said to be as large on an average as a hazel-nut. This variety of chancre usually occurs as a result of the action of caustics, friction, improper treatment, and filth.

Silver spot is one of the more rare variety, and was first described by Taylor, as resembling a pin-head sized spot of mucous membrane, which had been touched with carbolic acid or nitrite of silver. It generally occurs on the glans penis and on the lips of the meatus.

The follicular or umbilicated chancre is another rare variety in which are found small and sometimes large cup shaped lesions of a light reddish hue. (Hyde & Montgomery.)

Multiple herpetiform chancres occur in crops, first as a minute superficial erosion, persistent in its course, then multiple in number, and having a hemorrhagic tendency.

Infective balano-posthitis is the development of the primary lesion involving the mucous layer of the prepuce, and sometimes of the glans, and is really a specific erosion. The prepuce is thickened, reddened, and inflamed.

Mixed infection or mixed chancre is a condition in which the initial lesion, as the consequence of pyogenic infection, undergoes ulceration resulting in one or more lesions, strongly resembling the chancroid with the characteristic induration of the primary lesion. It is really a condition in which there is a simultaneous presence of the chancre and the chancroid.

Chancre of the urethra which may occur at the meatus or fossa navicularis are extremely important and difficult of early diagnosis. When the meatus is involved, the induration is very marked, imparting to the touch a sensation of a pea in the urethra. An important diagnostic

symptom of chancre in the meatus, is the discoloration of the glans, which may become purplish-blue in color. Lesions at this point are also always attended with great pain and burning on urination. When the urethral chancre is in the fossa navicularis, the first symptom is a muco-purulent discharge with glueing of the lips of the meatus, resembling gonorrhœa. There is little or no pain except on urination, and with an erection. By means of the endoscope, palpation of the adjacent lymphatic glands and the nodular induration at the point of the lesion, the diagnosis is readily made.

Chancres of the finger occur frequently among physicians, dentists, accoucheurs, and nurses of both sexes. It is most commonly found in the form of an excoriative or ex-ulcerative area, and is seen usually near or at the tip of the finger. In its incipiency it is indolent and painless, but in the course of a few weeks develops into a large, smooth or granular mass of morbid tissue. These conditions are attended with no characteristic induration. Digital chancre must not be mistaken for simple sores or whitlows. Their specific nature is readily confirmed by an examination of the epitrochlear and axillary glandular enlargement, even before the eruption appears.

Chancre of the tongue appears as a well-defined mass, or nodule at the tip or lateral border. The surface is eroded, and covered with a pseudomembrane. They are usually indolent and persistent in their course. The sub-maxillary glandular enlargement is a great aid in the diagnosis. It is important to bear in mind the differential features of chancre from that of cancer of the tongue. (See differential table.) Both begin as a small nodule and are *attended with glandular enlargements.* The age is an

important factor in making the diagnosis. In persons under forty-five years, the lesion will usually be specific. When past middle life or in late years the probabilities are that the lesion is cancerous. Chancres of the gums and hard palate are very rare and difficult to diagnose owing to the uncertainty of the condition being simply a mucous patch.

Chancres of the tonsils occur frequently and generally result from perversion of the sexual act. Therefore, when a patient complains of a chronic sore throat a physician should always be on the look-out for the accompanying submaxillary and sublingual glandular enlargement which soon becomes marked.

Termination.—Chancres rarely result in any destruction of the tissue but usually terminate by resolution, leaving but a faint trace or pigment. The secretion of the initial lesion is serous, or sero-purulent in character. The latter secretion is due to extraneous causes, e.g. by pyogenic organisms, etc. When this occurs it often leaves a more or less well developed scar.

Complications.—For various reasons, the initial lesion may undergo certain changes, most common of which are: septic inflammation, chancroids, papillomata, phagedena, gangrene, and mucous patches, each of which may be considered as a complication.

TREATMENT OF CHANCRE.

It has been conclusively proven that it is futile to attempt to *abort* syphilis by instituting immediate constitutional specific treatment. Such radical measures as early cauterization or extirpation of the glands in anatomical relation to the sore, and excision of the chancre have invariably

failed. The failure to abort is on account of the fact that there is, by the time the initial lesion appears a complete systemic involvement, even though the syphilitic processes have not had sufficient time to become manifest. Therefore, the treatment of the chancre simply resolves itself into *hygienic, tonic and local measures*. In its incipiency the chancre often resembles an innocent erosion or abrasion appearing as a minute, smooth round or oval excoriation, or as a simple papule.

It is of paramount importance at this time especially, that the patient isolate or reserve himself, so far as practical, until the nature of the lesion by its later evolution, is definitely known and thus avoid the danger of infecting other persons.

The use of acids and caustics is to be condemned, as they are absolutely of no avail, and only tend to increase the sclerosis which may remain permanent. The lesion must be kept constantly clean, the patient instructed to immerse and bathe the parts in mild antiseptic solutions several times a day. Hot normal saline solution, and boric acid (saturated solution), potassium permanganate 1-3000 are all excellent antiseptic solutions. The part is then carefully dried, a thin layer of absorbent cotton is spread over the surface of the lesion and saturated with lotio nigre, which consists of:

R	Calomel	grs. xxiv.
	Aquæ calcis	$\frac{3}{5}$ vj.

The patient should be instructed to keep this cotton moist continuously, and when it is changed, always bathe the part previously so that this cotton covering will separate from the granulating area without bleeding or *ain*. The lotion applied in this manner not only acts

as a protective covering to prevent irritation but is also slightly stimulating. Copper sulphate solution 1-200 and yellow wash may be also used in the same manner, and for the same purpose. Where the chancres are covered with a pseudomembrane, and there is a tendency to become necrotic and indolent, it should be sprayed with peroxide or hydrogen, then immersed in any of the above antiseptic solutions, cocainized, and by means of a small piece of cotton wrapped around the end of a tooth-pick, an application of acid nitrate mercury 1-10 or nitric acid 25 to 50 per cent. or pure carbolic acid should be made. Every effort should be directed towards preventing further ulcerations and complications, thus, by destroying the pseudomembrane a healthy surface is formed. Taylor recommends the use of mercurial ointment applied on a thin layer of cotton over the sore. Various dusting powders are also of use where the lesion is granulating. Iodoform is a most excellent remedy where the patient does not object to its odor. Calomel and bismuth, aristol, iodomuth, thymiodide, biodal, eulophen, and acetanilid are a few of the many stimulating powders that may be of service.

Lydston recommends the following formula as a local application. The odor of the iodoform being well disguised:

R̄	Menthol	gr. v.
	Iodoform	5iv.
	Spermaceti	5ij.
	Cerate q. s. ad.	5iv.

Chancres in women are treated according to the same principles. The vagina should be irrigated two or three times daily with warm solutions of either boracic acid, potassium permanganate, zinc sulphate, or alum. The lesions are then thoroughly dried and kept free from the vaginal

secretions by means of a tampon of cotton, and on it may be applied a thin layer of mercurial ointment. Applications of sulphate of copper 2 per cent. are often very effective in stimulating granulations.

Where there is any tendency to deep ulceration, pure carbolic acid or acid nitrate of mercury 1-10 are efficient as an application. The use of mercurialized benzoin as an antiseptic lotion is recommended as effective in keeping the lesions clean. (Hyde & Montgomery.)

Where the urethral orifice is the seat of the chancre, the burning on urination which almost invariably occurs, may be allayed by immersion of the penis in warm, mild antiseptic solutions. The lesions should then be touched with silver nitrate or copper sulphate (2 per cent. solutions) and some cotton interposed between the lips of the urethral orifice, so as to keep the mucous surfaces apart. Mercurial ointment is also of service in these cases.

Where there is a *mixed infection*—that is, the simultaneous presence of the chancre and chancroid, or pyogenic infection of the initial lesion, the treatment is practically the same.

CONSTITUTIONAL SPECIFIC TREATMENT, which ordinarily is never begun until the appearance of the secondary manifestations, is justified in some cases, simultaneous with the appearance of the primary lesion. These exceptional instances are, where the seat of the lesion is on the lips, tongue, or conspicuous anywhere about the face. Also where a diagnosis of the specific nature of the lesion is fairly well established. Urgent specific treatment is indicated when the seat of the affection is the soft palate, tonsils, or pharynx, and particularly where there is a threatened *destruction* of the part.

SECONDARY SYPHILIS.

At the end of the second period of incubation with the onset of the cutaneous manifestations the second stage of syphilis begins. Concurrent with this, there is likely to develop various constitutional morbid phenomena. This depends upon various factors, such as the diatheses, habits, poverty, environment, and filth. Syphilitic fever may or may not be present. The elevation of temperature has no distinct characteristic feature, from other febrile disturbances. It may be said to be of the remittent type and sometimes occurs either early or late in the disease. Neuralgia, headaches, and rheumatoid pains, are all attended with nocturnal exacerbations, which is characteristic of its specific origin.

Syphilitic cachexia may develop at any time during the evolution of the disease. Generally occurs in the debilitated and where there has been improper hygienic, and insufficient specific treatment. Jaundice is another complication which may be seen in the early stage of syphilis.

The kidneys and spleen may undergo some changes. The former may become the seat of a mild or severe involvement, in the early and late stages respectively. In such instances, albuminuria may be found.

When the spleen is affected it becomes markedly enlarged.

The osteoscopic pains are also a feature of early syphilis, and involve especially the sternum, clavicle, parietal, frontal bones, and the tibia. Other conditions which sometimes supervene in the early secondary stage of syphilis are hysteria, analgesia, disturbances in the reflexes, synovitis, rheumatism, tonsillitis, laryngitis, pleurisy, angina pectoris, and hemorrhagic effusions. (Taylor.)

Adenopathy, lymphangitis, and adenitis or bubo.—

Co-incident with the development of the initial lesion of syphilis, is the syphilitic hyperplasia of the lymphatic glands, in anatomical relation to the seat of the infection. From this lesion, the infection promptly ascends through the perivascular lymph spaces and enlargement of the lymphatics ensues. This involvement is characterized by its induration, absence of inflammation and its persistency. (Taylor.) The indurated vessel attaining a cord-like consistency. The lymphatics then become indurated, and persist until resolution of the chancre begins. These changes become manifest to the touch between the 6th and 10th day, after the appearance of the chancre. The glands particularly involved are usually in proximity to the focus of the infection. When the glands are chiefly implicated, syphilitic bubo results. They vary in size and the glands readily distinguishable from one another and are freely movable under the skin. These are attended with a little pain or inflammation. Suppuration of the syphilitic bubo very rarely occurs except from a mixed infection.

The submaxillary glands are distinctly enlarged, when the nipples and breast are the seat of the infection. The posterior cervical glands and the inguinal glands are also very frequently indurated, according to the relation of the seat of the lesion. The induration usually reaches its full development in the course of 10 to 15 days. When glandular enlargement is detected simultaneous with the primary sclerosis, the diagnosis of specific infection can be readily made.

Syphilis of the skin.—Secondary eruptions, syphilides or syphilodermata include the superficial lesions of early eruptive manifestations of the secondary stage. They appear usually about six to seven weeks after the primary

lesion of chancre. During this interval, or second period of incubation, the patient presents some subjective symptoms. These complex phenomena or prodromes present certain characteristics which, together with a carefully elicited history and examination of the sore, usually furnish sufficient data to establish an accurate diagnosis. The eruption which is general and symmetrically distributed, presents peculiar distinguishing features characterizing it from other skin diseases, and exanthemata. The later lesions of the secondary stage have a tendency to remain localized and invade the deeper portions of the skin, while tertiary lesions are distinctly more persistent and chronic in their course and involve extensively and deeply, certain tissues, for which they seem to have a predilection. Tertiary lesions are as a rule not symmetrical. The early eruptions of the secondary stage yield readily to proper treatment, and are marked by the absence of inflammatory symptoms and to the fact that they are superficially situated, being limited to the skin and mucous membranes in the form of a generalized rash. The difficulties in the diagnosis of syphilis have been admitted by the most skillful diagnosticians. The reason for this is that the cutaneous manifestations of syphilis may be imitated by quite a number of other less obnoxious skin diseases and that syphilis may often appear in forms which simulate the lesions of other dermatoses.

THE DISTINGUISHING FEATURES which may be regarded as peculiar to the syphilitic eruption, are (a) *its polymorphism*, i.e. several varieties of the eruption appearing at the same time, (b) the *absence of the itching and pain*, (c) its characteristic *ham or copper (sepia) color* pigment, (d) *the tendency to appear in groups* either of circular or oval form, i.e. of one variety of syphilide, surrounded by those of a different type,

and (e) *the tendency to localize* in certain parts, (f) the chronological sequence and course of the syphilides, (g) if the blood be pressed out of one of these papules by a piece of glass, there will be noted a brownish-yellow area, and (h) their *symmetrical distribution*—where they are found on one arm—they will be seen in a corresponding area of the opposite arm, etc.

The color is not due simply to local hyperæmia since it does not disappear on pressure, but is supposed to be due to extravasation of red blood corpuscles. Red is the predominant color in recent syphilitic eruptions.

Another peculiarity of the syphilides, is their *localization*. The most common parts where they appear, are on the scalp or at its border, angles of the mouth, forehead, on the alæ of the nose, about the anus, upon the genitals, and upon the palms (palmar syphilides), (Fig. 65.) and soles (plantar syphilides), the flexor surfaces of the limbs. Therefore, it is well nigh imperative that all these parts be examined as a matter of routine in making a diagnosis.

The ensemble of all syphilitic symptoms, in exceptional cases, may be closely imitated by non-specific dermatoses. The diagnosis of syphilis can be made with absolute certainty only when based on positive as well as on negative findings, that is when we not only find the characteristic elements of syphilis, but when we can with certainty exclude all other skin diseases which may appear under the similar symptoms.

Some of the DRUGS which may cause eruptions of the skin resembling syphilides are, *belladonna copaiba, quinine, chloral, antipyrin, sandal-wood-oil, iodide of potassium, bromides, and chlorate of potassium.*

It must also be differentiated from scabies, psoriasis, lupus vulgaris, tinea versicolor, measles, smallpox, chickenpox and *varioid*, the eruptions of which strongly resemble syphilides.

The concomitant and corroborative signs and symptoms of secondary syphilis may be enumerated as follows: (1) the lymphatic glandular involvement, (2) the primary chancre, (3) the secondary syphilides, (4) lesions of the tongue



FIG. 65.—Papulo-squamous syphiloderm of the palm. (After Schamberg.)

and buccal mucous membrane, (5) continued hoarseness as the symptom of tonsillar chancre, (6) the loss of hair, (7) headache, (8) osteoscopic pains with nocturnal exacerbations, (9) fever, and (10) albuminuria.

In the SECOND PERIOD, the blood is affected by a diminution of the hæmoglobin and red corpuscles, giving rise to syphilitic anæmia, which is persistent, especially in the ill-nourished.

SKIN ERUPTIONS IN SYPHILIS.

Secondary	1.	Erythema:	a. Roseolar
			b. Macular
			c. Purpuric
	2.	Dry {	Large and small flat lenticular
		Papular {	Large and small conical or miliary
		Moist {	Large and small { Condylomata
			Mucous patches
Tertiary	3.	Pustular:	Acneform
			Variolaform
			Impetigoform
			Ecthymaform
	4.	Pigmentary:	Large and flat Rupea
			Large flat or Impetigoform
	5.	Tubercular:	Ulcerative
			Non-ulcerative
	6.	Bullous	
	7.	Rupial	
	8.	Gummatous	
	9.	Serpiginous	

PERIODS OF SYPHILIDES. (Sturgis and Cabot)

Variety.	Time Due.	Duration.
Erythema	6 to 12 weeks	3 to 6 weeks
Papular	2 to 6 months	4 to 8 weeks
Pustular	6 to 15 months	2 to 4 months or more
Gummata	1 to 5 years or more	$\frac{1}{2}$ to 2 years or more

Syphilides appearing in combination such as papule and pustules are often referred to as "papulo-pustular," "pustulo-crustaceous," "syphilo-derma," "papulo-squamous," etc. (Fig. 65.)

The erythematous syphilides are usually the first of the syphilitic eruptions to make their appearance.

SYNONYMS.—Syphilitic roseola, macular syphilides, exanthematous syphilides. The erythematous syphilide is of a very faint pinkish color, consisting of round or oval areas with a distinct or irregular outline, averaging about 1 c.c. in diameter. Sometimes they appear as a decided red or even purplish hue.

Exposure to cold accentuates their color. They are seldom elevated, nor do they undergo desquamation. The spots first appear on the body as a rule, but may be seen first on the face. They soon become profusely distributed over the abdomen and thorax, and on the inner surfaces of the limbs. * They present the characteristic mottled appearance. Sometimes a few patches may be found on the palms and soles. The dorsal surfaces of the hands and feet are rarely invaded. The neck is likewise included in this invasion. The roseola spots are of ephemeral duration and disappear very quickly in the order of their appearance.

THE DURATION, however, depends largely on the intensity of their color, and on treatment.

DIAGNOSIS.—The distinguishing diagnostic features of the erythematous syphilide are the form of the hyperæmic patches, its color, distribution, and its characteristic circular or oval form. The conditions with which it may be mistaken are: the erythema, following the administration of balsams, mercury, cubebs, copaiba, and the iodides. The rash which occurs in scarlatina, rubeola, tinea versicolor, pityriasis, maculata, roseolar vulgaris and erythema multiforme may be often mistaken for the erythematous syphilide.

TREATMENT.—Should they become pigmented, constitutional treatment must be supplemented by the use of inunctions or fumigations of mercury, otherwise the tonic specific treatment is all that is necessary.

The **papular syphilides** may also constitute the first or early symptom of secondary syphilis, or they may occur together with the erythematous variety. They present two forms; the large and small flat lenticular, and the large and small conical or miliary, which constitute the dry papular syphilides. Another variety of papular syphilides is, the large and small.

Moist papules occur in the form of condylomata and mucous patches. The small papules are about the size of a millet seed or several times as large. They consist of circumscribed or rounded elevations of the skin and in their earlier stages are of a deep red color. When they occur in the early secondary stage they are general in their distribution over the entire body, including in its invasion, the face and neck. When the skin is the seat of mucous patches, the regions in which there is moisture, heat and friction, are the most commonly affected, therefore, they are frequently found in the mouth of the anus, perineum in the male, nares, breasts, and vulva in the female. When they occur upon the scrotum and penis they usually undergo an excoriation and develop into condylomata.

Condylomata.—Synonyms: Condylomata lata, verruca accuminata, moist wart, and venereal wart.

Condylomata lesions may be flat or pointed. The former are distinctly syphilitic, while the latter occur in other venereal diseases. They occur generally as a consequence of filth, and most often appear about the vulva, perineum, and anus, owing to friction and irritation of adjacent surfaces. A distinctive feature of these lesions is their intense itching, thus characterizing it from the other syphilodermata.

When this eruption occurs early in the secondary periods *it is usually symmetrical*, but when late, may be seen simply

in one part. If the lesions are multiple they are most frequently unsymmetrical.

The **miliary papular syphilide's** peculiarity is that it usually begins about the face and neck, and is fully developed at the end of two weeks. This eruption may be mistaken for psoriasis or lichen planus.

The **large flat syphilitic papules** have practically the same characteristics as the small papules. They differ only in their area and are distinctly elevated. These syphilides assume the so-called copper hue. They show no tendency to circular formation and ordinarily do not coalesce except where there is friction or irritation.

DIAGNOSIS.—As a rule it is very easily made. The only other condition for which it may be mistaken is psoriasis.

Pustular syphilides are less frequently seen than the erythematous and papular forms. They vary in their size and intensity, generally round or oval in shape, and surrounded by a distinct areola. In their distribution they may invade the entire body, but sometimes are limited only to special regions, having a tendency especially for hairy parts. The pustules are more rapid in their invasion. Relapses of this eruption are common. They are scattered but are almost invariably symmetrical. The pustular eruption may appear as: acneform syphilides, attacking the hair and sebaceous, which are really papulo-pustules, or they may be **impetigoform** or pustulo-crustaceous syphilides, which are superficial lesions with a tendency to become serpiginous in character. Again in some cases it may simply consist of round superficial pustules, strongly resembling the eruption of variola, sometimes called the **variolaform syphilides**.

The **syphilitic ecthyma** is another form of pustular

syphilide. The pustules become large, and by desiccation of the contained pus, crusts are formed. Their color is light brown, and are round or oval in shape. Beneath the crust is a well-formed ulcer which involves the superficial or deep layers of the skin. Ecthyma may appear about the scalp or flexor surfaces of the extremities, the chest and back, inguinal, abdominal and gluteal regions. The deep variety of syphilitic ecthyma occurs usually as a late lesion though it sometimes appears early especially in malignant syphilis.

Tubercular syphilodermata may be dry or non-ulcerative and ulcerative. They bear a strong resemblance to gummata. The tubercle is more superficial, develops earlier, is more numerous, and much more common than the gummata. They develop at any period of the disease even from a few months to ten years after the infection, but is generally a *tertiary manifestation*. These lesions may occur at any part of the body, and very frequently attack the face. They vary considerably in size, being anywhere from $\frac{1}{2}$ cm. to 3 cm. in diameter. They appear as well-defined nodules, with a tendency to globular shape. In color they are of the ham or copper tint. They form in a characteristic circle or sometimes resemble the letter S, which is distinctly pathognomonic of syphilis. The ulcerative form results in a cicatrix or leaving a distinct pigment at the site of each tubercle. This occurs especially in the non-ulcerative variety. The ulcerative tubercular syphiloderm is the condition in which the tubercles degenerate or undergo ulceration, and may remain either superficial or involve the underlying tissue. When these remain circumscribed, the crust covered tubercles surround an unaffected area of *skin*. This circular formation is distinctly characteristic.

In the more aggravated form the tubercles are larger, of a deep violet color; after continuing for a longer or shorter period they inflame, suppurate, and are replaced by deep foul smelling, painful ulcers. Tubercular syphilodermata must be distinguished from lupus vulgaris, psoriasis and carcinoma.

Pigmentary syphilides are seen in the form of various size areas or patches with the pigment, more or less distinct, which sooner or later undergoes leucodermatous changes in the form of small spots, which gradually increase in size. This is called the *retiform pigment syphilide*. Pigmentary syphilides may appear at any time during the secondary stage. It is often usually found during the second year of infection. It is distinctly an eruption of the female sex, particularly of the blonde type. (Taylor.) It occurs most commonly on the lateral surfaces of the neck, and the forehead, rarely invading the face. The plaques are well-defined, though their margins may be irregular.

The conditions with which pigmentary syphilides may be confounded are, chloasma and tinea versicolor. The situation of the eruption, especially when it occurs on the lateral surfaces of the neck, characterizes it from either of these affections.

Syphilitic affections of the mucous membranes in the secondary period are liable to appear within four or five weeks after the initial lesion.

The parts usually affected are the tonsils, palate, pharynx, tongue, cheeks, and lips. Well-marked signs of the disease frequently appear at the anus, and lower part of the rectum, upon the foreskin, and head of the penis of the male, and upon the vulva, vagina, and uterus of the female.

SECONDARY AFFECTIONS of the mucous tissue occur in

various forms, as an erythematous disease, as a tubercle, or as an ulcer or erosion.

SYPHILITIC ERYTHEMA occurs most frequently in the throat, affecting the arches of the palate, uvula, pharynx, and sometimes the root of the tongue. The inflammation is either diffused, or occurs in distinct mucous patches of a circular or oval form.

ULCERS of the throat generally make their appearance on the uvula and tonsils, arches of the palate, and back of the pharynx.

The superficial ulcer is either simply an erosion, or an excoriation cavity with a well-defined, ragged edge, rather sharp and somewhat undermined. It usually presents itself early after the primary sore.

In the excavated ulcer the edges are steep, everted, and ragged, and are surrounded by a hard, inflammatory, copper-colored base; the discharge is thin and ichorous; the sore is most distinctly marked on the tonsils. They are liable to take on phagedenic and gangrenous action, and extensive destruction of the soft palate frequently results. The excavated form of the lesion is usually accompanied by extensive swelling, together with great pain and difficulty in swallowing. Mucous tubercles generally occur upon the tongue, lips, inside of the cheek, tonsils, and palate; they are slight elevations of the mucous surface, usually of an irregular oval or elongated shape, and of a whitish hue.

Syphilis of the mouth and the tongue plays a very important rôle not only because it is a frequent seat of the disease but because of the part it plays in its transmission. The use of tobacco, pipe and cigar holders, eating utensils, etc., and kissing are the most prolific sources of *infections in this part of the body*. Chancres occurring in this

region have been considered elsewhere (see chapter on Chancre). The lesions of constitutional syphilis in the mouth are usually superficial and multiple, with little or no tendency to spread, and are often symmetrical. This is especially true when they occur in the early period of the disease. Late lesions in the oral cavities are usually solitary and deep with destructive tendencies. The type of lesions which make their appearance in the mouth in a more or less modified term are macules, papules, tubercles, warts, gummata, and ulcers. These lesions are naturally of a moist type, with the result that mucous patches are by far the most frequent type exhibited. Erythema or syphilitic angina is also a very common specific affection, frequently seen in the second stage. In this neighborhood, it is usually confined to the fauces, especially in smokers. It appears 6 to 8 weeks after infection. The mucous patches are mostly seen on the tonsils, uvula, and soft palate, sides of the tongue, the mucous surfaces of the lips, and the buccal membranes. They are grayish-white in color, irregular in outline, and are not, as a general rule, raised above the level of the mucous membrane. They are usually quite persistent and chronic in their course.

TREATMENT.—Applications of nitrate of silver or sulphate of copper solutions 15 to 20 grains to the ounce. The mouth and throat must be kept clean, by the use of solutions of borax, chloride of potassium, and listerine. Smoking should be prohibited, and the use of alcohol and irritating foods interdicted. An application of 2 or 3 per cent. solutions of chromic acid is also very serviceable in these conditions.

Syphilitic affections of the larynx in the secondary stage are, erythema, mucous patches, superficial ulcerations, and hypertrophy.

The symptoms of any of these conditions which may



FIG. 66 —SYPHILITIC ALOPECIA. (After Schamberg.) Note the dry moth-eaten appearance.

occur early or late in the secondary stage may be so slight as to escape attention.

Phonation may be affected to some extent. Where the lesions are ulcerated or where there is chronic inflammation of the larynx, hoarseness results which is very persistent.

TREATMENT.—If they do not yield to internal specific treatment, spray the part with Dobell's solution and cauterization of the deeper lesions with nitrate of silver (30 grains to the oz.), or acid nitrate of mercury (1-10).

Syphilitic affections of the hair.—The loss of hair or syphilitic alopecia is a very common symptom of syphilis.

The hair about the face and other parts of the body may be involved as well as the scalp. The loss of hair is usually rapid but rarely permanent. It may occur in patches which are irregular and without symmetry, and varying considerably in size. (Fig. 66.) The conditions for which syphilitic alopecia may be mistaken are, alopecia areata, and seborrhœa.

TREATMENT.—Must be vigorous both locally and constitutionally. Mercurial inunction, frequent shampooing in the affected area and rubbed with an ointment of resorcin (15 grs.) and cold cream (1 oz.). This application may be made night and morning. White precipitate (30 grs.) to cold cream (1 oz.) is also an excellent agent in this affection.

SYPHILITIC AFFECTIONS OF THE NAILS.

Onychia, invading the nails primarily and **perionychia**, the disease beginning in the tissues about the nail and involving them secondarily. The two conditions may co-exist. They are slow in their course and appear generally in the secondary period, but may occur much later. There are two forms of onychia, the dry or *onychia sicca*, and the hypertrophic. In the dry form the nail is dull in color, may

be part or wholly involved, and its edge thickened and brittle. The surface is very irregular, causing deformity of the fingers. The hypertrophic form which may involve the nails of the fingers or toes presents a distinctly thickened



FIG. 67.—DIFFUSE PERIONYCHIA. (Taylor.)

condition of the nail, very pale in color, and the surface very *much* roughened by minute depressions. Perionychia or *paronychia* oftener invading the toes than the fingers and involv-

ing one or more digits (Fig. 67.). It generally occurs coincidentally with the appearance of the syphilide on the rest of the body. There are three forms of perionychia—ulcerative, non-ulcerative, and a diffused form. The ulcerative form appears at the matrix, as a small ulceration, or it may begin as a papule or pustule. The ulceration gradually extends along the margin of the nail, or under it, and secretes a foul smelling pus. Pain may be slight or severe. Where the destruction has not been extensive, a new nail may appear, which may be but slightly deformed, or it may be as good as the original nail. These affections of the nails usually occur in the middle aged and debilitated class of patients. The separation of the nail may be partial or complete and may occur with little or no pain. Syphilitic perionychia is very persistent in its course and may be attended with constitutional disturbances, and an enlargement of the axillary glands. The diagnosis of ulcerative perionychia should not be mistaken for the initial lesion.

TREATMENT.—Vigorous constitutional treatment is always required in these affections. The affected fingers or toes should be soaked several times daily in hot bichloride solution (1-1000). Where there is ulceration or a destructive tendency cauterize with acid nitrate of mercury solution (1-10). Again immersing the part and then copiously dusting it with iodoform. The fingers should then be placed on a splint and the arm carried in a sling.

Syphilis of the eye and its appendages.—The lids and conjunctiva are very commonly involved when the secondary syphilides appear about the face or forehead. Alopecia of the scalp may be attended with falling of the eyelashes, often followed by a simple catarrhal conjunctivitis. Gummata may develop on the eye-lids soon undergoing ulceration

which may then be mistaken for lupus or epithelioma as the auricular glands in both of these conditions are enlarged.

Lacrymal glands may become involved in any period of syphilis where the lesion, such as chancres and syphilides, appear in its vicinity or may result in syphilitic lesions of the nasal passages. The symptoms of syphilitic affections of the lacrymal glands, are pain and swelling of the part, and a profuse secretion, sero-purulent in character, expressed on pressure over the mass. The canal may be occluded, and result in abscess, periostosis, caries and necrosis.

TREATMENT is specific constitutional medication and surgical.

Syphilis of the sclera usually appears in early life as it is most frequently a hereditary affection.

Scleritis may manifest itself by a diffuse or nodular thickening of the sclera.

TREATMENT.—Consists of constitutional remedies, hot fomentations, dry or moist, and the instillation of a few drops of atropine, once daily.

Gumma may either arise primarily or secondarily in the sclera.

Syphilitic affections of the cornea may occur as a parenchymatous or interstitial keratitis. It is found most frequently in early life, and is a characteristic symptom of inherited syphilis (Hutchinson). There are points of opacity centrally situated, pale bluish-gray in color and scattered through the deeper layers of the cornea, these spots soon coalesce assuming the haze or characteristic "ground-glass" appearance. Later the cornea becomes highly vascular. The corneal opacity then gradually clears up, beginning at its periphery. The course of the disease is extremely chronic with tendencies *to relapse*, and usually attacks both eyes. The symptoms

that are pronounced are those of irritation, such as photophobia, lacrymation, pain and neuralgia.

TREATMENT is constitutional and local. Instillations of atropine, to prevent the formation of iritic adhesions. Hot fomentations, and the eye kept continually protected from the light by means of a shade. It is necessary to supplement the specific treatment with tonic measures.

Iritis is the most common of the syphilitic affections of the eye. It may either be acute, subacute, or chronic, and is likely to occur at any period of acquired syphilis. Clinical varieties of iritis are the plastic, serous, and exudative. Usually but one eye is affected, to which relapses, when they occur, are limited. The subjective symptoms are photophobia, lacrymation, pain and defective vision. The objective symptoms are tumefaction; peculiar color; irregular outline of the pupil, which may be oval, jagged, or stellate, due to synechiæ; sluggish reaction of the iris to light, and a deep ciliary injection. Plastic iritis of early syphilis, the small nodules forming at the pupillary margin, are characteristic of syphilis. Gummata of the iris usually leads to considerable destruction of tissues and sometimes perforation of the eye-ball.

TREATMENT.—The eye must be put at complete rest, the patient kept in a dark room, the pupil kept dilated continuously with atropine solution, and application of hot fomentations over the eye. Counter irritation to the temple, or blood-letting by means of leeches to the temple are often efficient in relieving the intense pain. The interocular tension must also be carefully watched.

Syphilis of the choroid.—The forms of inflammation which affect the choroid in syphilis, are: diffuse choroiditis, central choroiditis, and chronic disseminate choroiditis.

Diffused choroiditis involves the whole choroid and is sometimes called chorio-retinitis. The chief subjective symptom is the disturbance of vision.

Disseminate choroiditis is a chronic affection. One of commonest forms of syphilitic lesions of the choroid, is characterized by the presence of numerous ill-defined, yellowish-white or reddish spots of infiltration which appear beneath the retina and scattered through the fundus. Unless the infiltration encroaches upon the macula, the vision is not necessarily impaired.

Choroiditis centralis is characterized by an exudation which occurs directly in the neighborhood of the macula, causing visual disturbances.

PROGNOSIS in this condition is always unfavorable.

TREATMENT consists in vigorous antisyphilitic measures which will often obtain marked improvement. Diaphoresis and the application of leeches to the temple is recommended. The eye should be put at rest and protected from the light by the use of dark glasses.

The retina is the seat of the following syphilitic affections: 1. simple retinitis, 2. exudative retinitis, 3. retinitis hemorrhagica, and 4. retinitis recurrens.

All these affections are practically identical in both their causes, symptoms, diagnosis, and treatment, as the syphilitic affections of the choroid, and, therefore, need not be repeated here.

The optic nerve may be the seat of late manifestations of syphilis. These affections are papillitis, retrobulbar neuritis (which is very rare) and optic neuritis. These conditions may accompany the severer forms of syphilitic retinitis, or may come on in many cases of cerebral gumma. Vision may be rapidly destroyed.

TREATMENT will sometimes be followed by an improvement or cessation of symptoms. These changes under antisyphilitic treatment are significant of its specific nature of the lesion.

The ocular muscles.—Paralysis of these muscles, due to syphilis, may be brought about in various ways, such as from gumma at the base of the brain pressing upon the nerve trunk or from affection of the third, fourth, fifth, and sixth cranial nerves, should they be the seat of syphilitic neuritis. The ocular motor paralysis may be temporary or prolonged in its course and sometimes permanent. Care must be taken not to confound the syphilitic from the tabetic muscular paralysis. Diplopia is a very common symptom in this affection.

Constitutional specific treatment must be vigorous and persisted in until the process is controlled.

Affections of the ear in syphilis are comparatively rare and have no distinct characteristics. Gumma may occur at the auricle. Ulcerations, condylomata, and the syphiloderma may occur on or about the external ear.

Affections of the internal ear are quite common in hereditary syphilis, manifesting itself by deafness.

TREATMENT of the early conditions is constitutional, hygienic, diaphoretic and by blood-letting by means of cups or leeches. Constitutional treatment must always be persisted in.

TERTIARY SYPHILIS.

Following in the chronological order of Ricord's division of the disease, syphilis passes into the tertiary period when it is not controlled and eradicated in the secondary stage.

Tertiary lesions usually attack the deeper tissues and

therefore are more destructive in tendency, than the lesions of secondary syphilis.

The AFFECTIONS OF THE MUCOUS MEMBRANES consist in the formation of ulcers, and mucous patches about the mouth.

The EYE-LIDS are frequently attacked in tertiary syphilis. It generally shows itself as an indurated ulcer, of an oval shape. The borders are inflamed and thickened, and the conjunctiva is usually inflamed.

Affections of the periosteum and bones present themselves in the form of nodes or gummy tumors, inflammatory hypertrophy, exostosis, caries and necrosis. These affections may come on at any time after eighteen months from the first affection. They are most likely to occur in persons of a scrofulous habit, or whose constitutions have become impaired from any cause.

The bones affected with tertiary syphilis are those that are superficial, or at least protected by the soft parts, as the tibia, fibula, ulna, clavicle, and bones of the skull, nose, palate, and upper jaw.

Nodes occur usually upon the tibia, ulna, clavicle, frontal and parietal bones.

They are usually circumscribed, semi-solid swellings, of an ovoidal shape, and slightly elastic to the touch.

The periosteum and bones are inflamed, softened, and ulcerated, and as the tumor extends, the structures over the seat of the disease become red and painful, and ulceration finally takes place at the most prominent point. The course of the disease is chronic, and it is attended with an intermittent, neuralgic pain, greatly increased at night.

CARIES is most common in the long bones of the extremities, in the skull, and in the palate, maxillary, nasal, turbinate, ethmoid bones, and vomer.

HYPERTROPHY of the osseous tissue is exceedingly common, and may involve many of the bones. Those most liable to be attacked are the tibia, fibula, femur, ulna, radius, and cranium. The tumor is usually knotty and irregular, with a broad base and a rough sabrous surface. In long standing cases it becomes hard, assuming the consistency of ivory, which is very characteristic of syphilitic osseous affections.

ETIOLOGY.—The development of tertiary lesions following the secondary period of syphilis is probably favored by an impaired or debilitated constitution. The most frequent cause, however, of tertiary syphilis is neglect, improper or insufficient treatment.

The secretions from tertiary lesions are not infectious.

The **TERTIARY SYPHILIDES** are: gummatous, tubercular, serpiginous, rupial, and the bullous.

Gummatous syphilides always begin in the subcutaneous connective tissue. May be ulcerative or non-ulcerative. Gumma very frequently develops in the female breast and sometimes though rare, in both breasts. The recognition of gumma is important so as not to confound it with epithelioma. They appear very insidiously, are painless, and of the consistency of an enlarged lymphatic gland. There is no retraction of the nipple, nor are the axillary glands affected.

Gummatous ulceration occurring on the leg is usually accompanied with more or less œdema. (Fig. 68.)

Gummata of the scalp are usually adherent to the thickened integument overlying it. The sebaceous or hair follicles are the seat of the beginning ulceration. Sometimes the outer table of the skull becomes enclosed. The invasion is very slow. The gummatous secretion has a very foul

odor. Gummatous tumors show little or no tendency to



FIG. 68.—ULCERATING GUMMATOUS SYPHILIDE OF THE LEG.
(After Schamberg.)

resolution and are attended with little or no pain, unless
overlying or resting upon a nerve trunk.

TREATMENT.—Constitutionally a vigorous mixed treatment until the destructive tendency is checked. Surgical treatment should be immediate, especially when there is a suppurative tendency. Copious dusting with iodoform, or the application of mild mercurials are very efficient. When the lesion is cerebral or spinal, mixed treatment should be persisted in and the dose increased until the symptoms are controlled. Sometimes it may be necessary to supplement the constitutional treatment by hypodermatic injections of gray oil or bichloride of mercury.

Tubercular syphilides (see chapter on secondary eruptions for the description of tubercular and pigmentary syphilides).

Bullous syphilides when they do occur are really the forerunners of pustules. The serum which they contain soon becomes transformed into pus. The bulla surround a red areola, and vary in size. Desiccation of the pus soon forms a dark adherent crust and are most usually found on the extremities.

Syphilitic bullæ are almost invariably of a late eruption occurring usually in debilitated patients.

Rupia or rupial syphilide is an ulcerative lesion, covered by a layer formation of crusts, somewhat resembling an oyster-shell. It is a late lesion, may be large and small, single and multiple. Rupial lesion which is in its beginning a pustule surmounted with an adherent crust, underneath of which an ulcerative process continues increasing the size of the lesion with the progressive formation of crusts. This lesion is more superficial than the ecthyma. Its outline is comparatively even, they may be round or oval and may in its beginning appear about the face or flexor surfaces of the forearms, later invading the rest of the body, they are alw----

more or less painful. The prognosis depends upon the general condition of the patient, if the lesions are accompanied by cachexia, the lesions will usually be more refractive to treatment. When the lesions are very large and numerous it is always unfavorable.

TREATMENT should be directed towards the patient as well as the disease.

Constitutional specific treatment must be vigorous and supplemented by hygienic measures and tonics.

The serpiginous or wandering syphilide is a superficial ulcer, involving extensive areas with the ulceration persistent at the periphery, while it heals in the center. It is attended with very little pain, is chronic in its course, may be *superficial or deep*, and is usually a large lesion. Superficial variety begins in the form of a pustule which soon undergoes ulceration, with formation of thick crusts at the periphery, where they remain adherent, while at the center they separate, leaving healthy granulations. The deep serpiginous syphilide, which is distinctly tertiary, begins its ulceration at the seat of a tubercle, ecthyma, or gumma. This ulcer grows quickly and may attain considerable size. It has the same characteristic as the superficial variety, except that it leaves a more distinct scar, at which point, there is often a tendency to recurrence. Fortunately this type of syphilide is rare. It is very slow in its course sometimes extending over several years.

TREATMENT consists in removal of the crust and treatment of the ulcer. Internally, the iodides and mercury, or mixed treatment should be given.

Syphilitic affections of the tongue in the late and tertiary periods are sclerosis and gummata. SCLEROSIS usually develops after the 4th or 5th year of infection. May be super-

ficial or deep, circumscribed or diffused, with no tendency to ulceration except as the result of injury. Deep sclerosis may be hypertrophic or atrophic. The atrophic condition is caused by fibrous contraction of the new formed connective tissue.

The gummatous lesion may be superficial or deep. The distinguishing traits should always be looked for in establishing a diagnosis of gumma from epithelioma, glossitis of dental origin and tuberculous ulcer. A cancerous process is composed of an ulceration seated in an elevated neoplastic mass, but in some instances a sufficiently characteristic elevation does not exist, because it has become destroyed by the process of ulceration, and then one only finds a sort of cavity which varies in depth. The base is indurated, a most constant character of lingual chancroid. The ulceration has a bad aspect, irregular, sanious and with everted edges. The comparative absence of pain, even to mastication and irritant foods, their insidious formation, the peculiar involvement of the lateral borders of the tongue near its tip, and its appearance at a much earlier age, all point to a syphilitic lesion. Another distinct feature of a gumma is that it begins as a nodule in the substance of the tongue. Gummata are usually multiple and symmetrical and always upon the upper surface of the tongue, in contradistinction to carcinoma which are generally single and may appear on any part of the tongue, particularly on its upper surface. Carcinomata are very vascular and therefore bleed more readily than gummata. In gummatous lesions of the tongue the submaxillary and sublingual adenopathy is absent, whereas in the malignant lesions it is always present. Sections of the growth examined by the microscope usually reveal the nature of the lesion. One might be led

to believe that with all these diagnostic signs, mistakes would be infrequent, but in reality it is often difficult to make a diagnosis, so that a histologic examination must frequently be resorted to, or the effects of antisyphilitic treatment tried. The effect of specific treatment is very significant, but not always confirmatory. The therapeutic test may render great service. Potassium iodide and mercury, especially the latter, should be given, and Fournier advises injections of calomel as this salt appears to possess a real specific action on lingual syphilitic lesions.

Gummatous infiltration of the soft palate and pharynx are attended with few distinct early symptoms. The patient may suddenly lose both his power of speech and of swallowing. The destructive process may result in perforation of the soft palate with a consequent regurgitation of foods through the nose, in the act of deglutition. The voice is distinctly nasal and whispering. The only other disease which may cause this condition is tuberculosis. The specific treatment here is a very valuable confirmatory evidence in making the diagnosis. Syphilitic ulcerations of the pharynx usually leave distinct cicatrices in the forms of irregular whitish areas and bands. Here also the diagnosis of deep ulcerations of syphilis is difficult to differentiate from those of tubercular lesions. But a careful history, examination of the patient, and the reaction to treatment, will usually elicit an intelligent deduction.

Tertiary affections of the larynx are: chronic inflammation, deep ulceration and gummata.

CHRONIC INFLAMMATION of the mucous membrane usually gives rise to the thickening of the cords which may interfere with respiration. When ulceration supervenes it results *in a permanent huskiness or loss of voice.*

Cancerous affections of the larynx may be recognized by the extreme pain, its slower course, and the characteristic glandular enlargement accompanying malignant lesions.

Tertiary affections of the œsophagus are very rare.

When ulceration occurs, stricture inevitably results, owing to the impossibility of early recognition.

TREATMENT is purely surgical. Gradual dilatation may be given a trial. The trachea is often the seat of gummatous infiltration, resulting in ulceration, contraction, and stenosis.

SYMPTOMS are dyspnoea, and hoarseness of voice.

Syphilitic morbid affections of the bronchi and lungs are very rare and difficult to diagnose. The liver is the most frequent seat of tertiary lesions of the viscera, and may be *amyloid degeneration, hepatitis, and perihepatitis*. There are two forms of hepatitis—the diffuse and gummatous. The liver is enlarged, irregular, and nodular, and may be attended with pain which is either localized or diffused, and sharp or dull in character. Ascites and albuminuria may occur, and where the condition is persistent, the patient's skin may assume a jaundice hue.

The **spleen** may be involved in the late period of syphilis, with gummatous infiltration. The organ is distinctly enlarged and the capsule thickened.

Stomach and intestines are very rarely involved in syphilis and are only found by microscopic examination of the suspected tissues, post mortem.

Syphilis of the rectum.—Ulcerations of the mucous membrane, or gummatous infiltrations, unless they receive proper treatment are attended by a new connective tissue growth, which usually results in rectal stricture.

PROGNOSIS.—If found early, before there is cicatricial

contraction, and treated properly, both constitutionally and locally, the ulcerative lesion is curable.

Syphilis of the anus.—CHANCRES may be seen internal or external in the outer rim for a distance of about an inch from the anal ring. GUMMATA may develop above the internal sphincter, in which case, narrowing, or stenosis of the rectum usually follows. When they occur externally, gummata are usually irregular in shape, of a distinctly red color, are markedly fissured, and covered with a slimy secretion. Accompanying the initial lesion in these parts there is an enlargement of the inguinal glands. CONDYLOMATA are also very frequently found at this point.

Syphilitic affections of the muscles.—MYOSITIS may occur in secondary syphilis but it is usually an affection of the tertiary stage. It is attended with rheumatoid pain and an impairment in the function of the part. When the condition becomes chronic, there is a tendency to more or less permanent contraction of the parts in which the muscle is affected. One or more muscles may be involved. The flexors of the arms, especially the biceps, are most frequently affected. Gummatous tumors of the muscles may be superficial or deep, and usually develop at the end of the muscles involving the tendons. They cause very little pain but may interfere with motion of the part. The TENDINOUS SHEATHS, TENDONS AND APONEUROSES, may be involved primarily or secondarily from lesions of neighboring structures. The part may become swollen, due to an effusion of serum, but it is accompanied with very little pain, unless it undergoes inflammatory changes.

The BURSE in one or more parts may be the seat of syphilitic processes in secondary and tertiary syphilis. The patellæ a very common seat for this affection. It is chronic in its

course, attended with very little discomfort and begins as a tumor, which is hard or fluctuating. Usually found unilateral but frequently involves both petallæ. The exciting cause is, as a rule, traumatism.

The bones are very frequently the seat of tertiary lesions, but are, in some instances attacked in the secondary stage. The osseous lesions are osteo-periostitis, osteo-myelitis, and osteitis. *Syphilitic osteo-periostitis* is limited to the superficial areas of the bones and the periosteum, and principally attacks the long bones and the cranium. The affected area may be œdematous. When the condition becomes chronic the bone itself becomes swollen.

OSTEO-PERIOSTITIS is a condition which generally attacks such bones as the *tibia, ulna, clavicle, and cranium*. The pain which occurs is usually attended by the characteristic nocturnal exacerbations and is produced by the nodes. During the day the patient is in most cases comfortable.

EXOSTOSES are due to periostitis. These new growths are sometimes movable on the bone. They vary in size and shape, and sooner or later become eburnate, which is permanent.

Gummatous osteo-periostitis commonly occur in the long bones, the cranial bones, and the phalanges of the fingers and toes. Cranial affections appear as solitary and multiple nodes. The bones of the face may also be the seat of gummatous infiltrations. The inferior maxillary, clavical, scapular, and vertebræ may each be the seat of these nodes.

Syphilitic affections of the bones is a rarefying process and the bones become fragile. These syphilitic morbid processes may even involve the joints.

SYNOVITIS frequently occurs and is seen as a lesion itself or from secondary involvement.

The fingers and toes are not uncommonly the seat of bone

syphilis which affection is known as syphilitic DACTYLITIS. (Fig. 69.) The condition is very insidious in its development.



FIG. 69—Gummata of the Metacarpal and Phalangeal Bones (Dactylitis Syphilitica) in a case of hereditary Syphilis. (After Schamberg.)

The patient first notices slight swelling of one or more fingers or toes. One or more phalanges of either part may be involved and sometimes include the metacarpal or metatarsal bones. Soon the joint becomes implicated, flexing the finger. Dactyl-

itis is usually secondary to periostitis, or osteomyelitis. The condition is comparatively painless in most instances. Dactylitis with gummatous infiltrations may or may not undergo ulcerative changes. These conditions result either in a thinning or thickening of the bone and shortening of the finger.

TREATMENT consists in administering both the iodides and mercurials (mixed treatment) and locally a mild mercurial ointment. These measures are usually followed by rapid involution, especially when the condition is recognized early.

Syphilitic affections of the epididymis and testis may occur early or late in the disease. The epididymis may be slightly increased in size, usually painless, and hard. Swelling will be uniform or nodular, especially in tertiary syphilis, which in all probability is a gummatous infiltration. The testis may also be the seat of these hyperplastic changes, sometimes involving its coverings. Tertiary lesions are likewise painless and appear very gradually. The organ becomes swollen and hard in consistency and is less sensitive to pressure than the normal testis. Sometimes in syphilitic orchitis there may be an effusion into the tunica vaginalis, presenting the typical aspect of an ordinary hydrocele. These growths often become quite large and very hard. The complete absence of pain, even on pressure, is characteristic. The course of this growth will last several years. When it is formed as gummatous infiltration this large fibrous growth may become nodular and thus is sometimes mistaken for tuberculosis of the testis. It may also be confounded with sarcoma of this organ.

TREATMENT should consist in an energetic course of the iodides of mercury in large doses or the usual surgical measures. (See orchidectomy and epididymectomy.)

Syphilitic affections of the blood vessels are ANEURYSM (principally of the *aorta*), PHLEBITIS (of the *saphenous, crural, cephalic, and the basilic veins*) and syphilitic endarteritis and arteritis. (This is met with only in gangrene and gangrenous ulcers.)

Syphilitic affections of the nervous system.—Syphilis may affect the nervous system both in early and late periods of the disease. The early lesions are usually amenable to treatment, while the late lesions (which may occur as late as the 20th year after the infection) are more refractory to treatment. This affection is more common in men than in women and appears more frequently in early life.

Affections of the nervous system commonly result from pressure of osseous lesions or from syphilis of the meninges. Gummatous infiltrations are also a frequent cause.

Cerebral syphilis.—The cortex of the brain is usually the seat of a gummatous infiltration, being either circumscribed or diffused, in which instance the meninges are generally involved. This condition is spoken of as meningo-syphilitis, which may include one or both hemispheres. As a result of syphilitic affection of the blood vessels, such as endarteritis obliterans, there may form small aneurysms. In consequence of dislodgment of the embolus or thrombus, it is transferred by the blood current, to a distant point where the various syphilitic processes in the brain begin. The subjective symptoms commonly met with are headache, which should be recognized by its boring, thumping, constricting or grinding character, and its characteristic nocturnal exacerbations. As the condition becomes more pronounced there may be mental hebetude, stupor, coma and epilepsy. Other more rare symptoms are aphasia,

ocular muscle paralysis, hemiplegia, dementia, hemianopsia, and disturbances of the sense of taste.

Syphilis of the cord and meninges and its coverings become manifest by the development of spastic paralysis, loss of control of the rectum and the bladder, exaggeration of the tendon reflexes, muscular contractions, and more or less analgesia. Sometimes, though rarely, examination of the eye will find a persistent dilatation of one pupil.

Locomotor ataxia.—Sixty to eighty per cent. of the cases of tabes ordinarily met with are ascribed to syphilitic infection. The symptoms by which it is recognized are the existence of the Argyll-Robertson pupil, the absence of tendon reflexes, lancinating pain in the extremities, irritability of the bladder, paræsthesia and the ataxic symptoms.

Syphilitic cerebral tumors.—These growths vary in size and shape and may be single or multiple. As a result, there may be more or less impairment of motion with a later development of hemiplegia and paraplegia. This condition may follow the train of symptoms incident to cerebral pressure and its onset may be sudden. When it is more gradual in its onset, the leg or the arm power is lost first and then it gradually involves other parts. Disturbances of sensation or mental power may or may not result. Mental hebetude is almost constant.

Treatment may relieve and even sometimes cure. This depends largely upon the age of the patient, and the size of the neoplasm. Syphilitic hemiplegia is usually recognized by two features, 1. that it occurs early in life, and 2. that the patient rarely loses consciousness when attacked. Dementia, the symptom complex of this disorder includes mental, sensory and motor impairment. Mental disorder manifests itself with intervals of excitation and gayness of

spirits, alternating with depressions, and sometimes delirium and mania. The motor disturbances are made evident by the general tremor and loss of coordination. With this there may be vertigo, and visual disturbances, as well as defective hearing.

The **TREATMENT** consists in the energetic administration of the iodides, in addition to mercurials by the mouth or by inunction. Hypodermic injections of the sublimate are also indicated. The drug must be pushed to the highest point of tolerance.

EPILEPSY is another sequence of cerebral syphilis and usually occurs in the adult suddenly and without apparent cause.

The **DIAGNOSIS** of syphilitic epilepsy is based on the history of the patient, 2. paroxysmal headache, 3. the frequency of mental disturbance, 4. the frequent coexistence of optic neuritis, hemiplegia and aphasia, 5. age of the patient, and 6. the result of treatment. (Taylor.)

Malignant syphilis is that type of the disease, in which the manifestations are of a virulent type. These symptoms, which are often transitory, have a tendency to recur in an aggravated form. The lesions may be superficial or deep seated, and are more or less destructive in character. This form of syphilis usually attacks the debilitated, and where there is senility and alcoholism. The lesions are as a rule gummatous and often undergo ulcerative or suppurative changes, resulting in paralysis, blindness, insanity, etc., according to the respective location of the growth. Despite its gravity this form of syphilis rarely kills.

Syphilophobia is a term indicating a certain form of hypochondriasis in which the patient, in whom there is a morbid condition of the mind, either imagines himself diseased with syphilis or has an intense dread of syphilitic infection.

HEREDITARY SYPHILIS.

SYNONYMS.—Congenital syphilis, infantile syphilis.

The symptoms become manifest during the third and twelfth week after birth. In instances where active syphilis exists in its early stages, just prior to conception, the syphilitic affection of the foetus may be so intense as to cause its death.

The DURATION of hereditary syphilis depends upon its severity, and the extent of the lesions. Where the symptoms are superficial and mild it may disappear entirely under proper treatment, within a few months or a year. When the lesions are deep and extensive they may heal under treatment but recur from time to time until the age of puberty.

It is chronic in its course and always more or less uncertain. The SYMPTOMS do not appear in any definite order, and superficial and deep lesions may exist at the same time. A *generalized rash* appears early, in which papules, pustules, or vesicles may be seen singly or in combination. There is also the characteristic *sniffles* and *senile physiognomy*.

The latter lesions are more of the tubercular and gummatous type. After about the third year, the lesions are usually deep seated, affecting the *bones, viscera, and nervous system*. In most instances the visceral lesions are intrauterine in origin, possibly the first few months, and which recur after the first year. *Periostitis* may develop during the third and fifteenth year. The *mucous membranes* may be the seat of superficial or extensive ulcerative lesion.

The *eye* may be affected between the 4th and 6th year, or even up to the 20th year. The *cranium* and *teeth* may likewise undergo certain changes.

The SOURCE of the infection may be either from the father or mother or from both. The risk of contagion from either so

always depends upon the activity of the symptoms at the time of conception. When both parents are syphilitic, the offspring rarely escapes infection—which is of a severe type—and usually results in the death of the infant. If the mother alone has syphilis (and father is healthy) which was acquired previous to conception, the child is usually affected. If the disease in the mother was acquired after conception had taken place the liability of the infection being conveyed to the child is proportionate to the period of pregnancy at the time of which the syphilis was contracted. In the earlier months of pregnancy the danger is greatest, and as the term progresses the danger is less. Syphilis is most liable to be communicated to the foetus during the secondary period—even up to four years after the date of the initial lesion. The mother being healthy and giving birth to a child with syphilis acquired from the father becomes immune against syphilis hence *Colles* law, viz.: “A syphilitic child cannot infect its own mother after its birth,” consequently she may *nurse her child without danger* of contracting the disease herself. TRANSMISSION OF SYPHILIS FROM PARENT TO CHILD is more probable during the secondary period than during the primary stage. When the mother becomes pregnant DURING THE EARLY SECONDARY STAGE and active treatment has already been begun, abortion usually occurs in from the third to the seventh month. In cases of mild infection the birth of healthy children may follow several infected ones. After an interval of about five or six years from the date of infection of the mother, the risk of transmission is very slight.

Von Düring's formulation of **Colles' law** is as follows: “A healthy woman who, impregnated by a syphilitic man, has borne a syphilitic child may be free from all symptoms of syphilitic infection, and may be considered immune to

syphilis." This observation has been confirmed by Fournier, Ricord and other noted syphilologists. **Profeta's law.**—"A child born of a syphilitic mother in whom there are no evidences of the disease within a reasonable length of time after birth, is refractory or immune against any syphilitic infection."

SYPHILIS BY CONCEPTION.—By this term is meant that form of syphilis in which the mother is infected by the foetus during pregnancy, the father having *the disease* at the time of conception.

The terms **retarded syphilis** or **syphilis tardo** denote a condition in which there is a delay in the appearance of the symptoms of hereditary infection until the tenth, twentieth, or even the thirtieth year of life.

DIAGNOSIS.—When the symptoms become manifest they bear a strong resemblance to those of the tertiary type, and are difficult to distinguish therefrom. The history of the case may be the only guide to its hereditary origin. The evolution of hereditary syphilis in a child apparently healthy at birth, begins with the characteristic snuffling.

Signs of emaciation may make their appearance, and the skin become wrinkled and sallow, and, as Taylor describes it, the eye becomes prominent, the juvenile expression is lost and children look like little old men and women. Simultaneous with this, the infant may exhibit the various skin eruptions on the face, hands, feet, and genitals. When the child lives to the 3rd or 4th year and condylomata develop, it is positive evidence of the disease. After the second dentition, Hutchinson's teeth are almost invariably found. The cutaneous eruptions most commonly met with are the erythematous syphilides, and gummatous ulcerations. The testis may remain small and there may be absence of hair on

the pubes after puberty. The mammæ also remain small and the nose small and deformed. The hair is coarse and dry.

PROGNOSIS.—In mild cases and in infants at the breast it is favorable. In the retarded form where the lesions are superficial, the outlook is also good. Where the eye and ears are affected, or where there are visceral changes, it is less favorable. Recurrences of any of these affections are common.

Affections of the mucous membranes.—Coryza, which is one of the early and constant symptoms of hereditary syphilis, begins with a serous discharge from the nose, which is attended by the characteristic snuffling, especially during the sleep and in the act of nursing. The ulceration of the mucous membrane may involve the septum, producing the necrosis with perforation, and followed by a nasal deformity.



FIG. 70.—HUTCHINSON'S
TEETH.

MUCOUS PATCHES of the mouth are also a very common hereditary syphilitic affection, and bear the same tendencies and features as in acquired syphilis of the adult.

Syphilitic affections of the teeth in hereditary syphilis are best described by Hutchinson, after whom the affection is named. (Fig. 70.) Of this malformation which occurs during the second dentition, Hutchinson says: "As diagnostic of hereditary syphilis various peculiarities are often presented by the other teeth, especially the canines, but the upper central incisors are the test teeth. When first cut these teeth are usually short, narrow from side to side at their edges, and very thin. After awhile a crescentic portion from their edges breaks away, leaving a broad, shallow, vertical notch

which is permanent for some years, but between 20 and 30 usually becomes obliterated by the premature wearing down of the tooth. The two teeth often converge, and sometimes they stand widely apart. In certain instances in which the notching is either wholly absent or but slightly marked there is still a peculiar color (a dirty brownish hue) and a narrow squareness of form, which are easily recognized by the practised eye."

Treatment of hereditary syphilis is as a rule unsatisfactory, owing to the uncertainty of the symptoms and lesions. As soon as it is recognized, however, the prevention of conveying the disease to others must be impressed upon the parent, and the instructions given accordingly. The treatment should be continued several years. Children do not seem to be as easily affected with intestinal disturbances as adults from mercurials. The most popular mercurial salt, because of it being the best borne, and productive of most good in infants, is calomel, which can be given over an extended period in doses of $\frac{1}{12}$ to as high as $\frac{1}{3}$ of a grain, three times a day according to the age of the child, and the severity of the symptoms. The calomel may be rubbed up with sugar or milk to make it more palatable. When the disease is attended with marked anæmia, tincture of chloride of iron should be given. If there be any gastric or intestinal disturbances, paregoric or a little Dover's powder may be added to the mercurial preparation. Gray powder (hydrargyrum cum creta) may be given thrice daily in doses of $\frac{1}{8}$ or $\frac{1}{4}$ up to 2 grains each, combined with a little sugar of milk. Protiodide of mercury, beginning with the $\frac{1}{20}$ of a grain and gradually increased, is also efficient, but must be combined with the Dover's powder to prevent diarrhœa and colic, which almost invariably attends its use. The iodides

of potassium and soda, given in doses from 5 to 20 grs., three times daily, to children a year or over, are often a benefit in bone, cerebral, and eye lesions. In very young infants the dose should be about 1 gr. and must always be well diluted.

Another form of treatment which is very efficient and particularly indicated where there are osseous and visceral lesion, is giving the mercury by INUNCTIONS. These are especially of service where there are no complications, and should be persisted in until the desired effect is obtained. The ointment may be spread upon cotton flannel in the form of an abdominal binder and then carried around the child's body, and worn continually. In this manner the child receives a uniform amount without its knowledge. By its movements the mercury is rubbed into its skin by the friction of its clothes. *Contraindications* to the use of inunctions in children are debility, weakness or anæmia, and sleeplessness. Mercurial frictions are well borne by children. The Neapolitan ointment is made as follows:

- R̄ Metallic mercury 500 parts.
 Benzoinated lard 460 parts.
 White wax 40 parts.
- M. One to five drams to be rubbed into the skin.

For an infant, the ointment should be rubbed in with a piece of flannel on a different part of the abdomen every morning. The ointment should be allowed to remain. After a month of such treatment, it should be discontinued for a week, and then resumed. The procedure should be kept up for a year. Local lesions may be treated with:

- R̄ White precipitate 45 grs.
 Petrolatum or Oleic acid 1 oz.
- M. For local use.

After one year's persistent treatment, potassium iodide

should be given for 3 weeks, 10 days' intermission, then 3 more weeks of treatment. Every 3 months, inunctions should be resumed for 2 weeks.

PROPHYLAXIS is of the highest importance, and includes the careful choice of a wet nurse, the forbidding of kissing, and the use of cow vaccine exclusively with aseptic instruments.

In hereditary syphilis, at the end of a year of inunction, half to one teaspoonful may be given daily of Gibert's syrup:

R̄	Mercury biniodide	gr. iv ss
	Potassium iodide	℥ j
	Distilled water	℥ ii
	Syr. cinchona. q. s. ad.	℥ vj

At the end of the second year, 20 centigrammes or 3 gr. of potassium iodide may be given daily.

The liquor of Van Swieten is sometimes substituted:

R̄	Corrosive sublimate	1 part.
	Pure water	900 parts.
	Rectified spirits	100 parts.
M.	Dissolve the sublimate in the alcohol then add the water.	
	Dose ten drops daily for each month of age.	

The prophylaxis of hereditary syphilis includes treatment of parents, or the syphilitic pregnant woman, discouragement of marriage between syphilitics, and the nursing of the affected child by its mother, never by a nurse. Treatment of the mother should consist in the iodides and mercury and begun as soon as pregnancy occurs and continued throughout the entire period of lactation. Hypodermic injections of mercury are not recommended as routine treatment, as they are practically useless, and therefore should not be resorted to except in emergency. The dose of bichloride

of mercury given hypodermically is 1-32 of a gr. as a minimum, and 1-8 gr. as a maximum dose.

Treatment of the coryza consists in irrigations of the nasal tract, with mild antiseptic solutions, removing the mucus and inspissated material, and an application made to the mucous membrane with nitrate of silver solution (1 gr. to the oz.). Treatment of any of the other lesions is the same as in the acquired form of syphilis.

QUESTION OF SYPHILIS AND MARRIAGE.

A syphilitic father may propagate a diseased child, or infect the mother, by its conception up to 4 years after the disease was contracted, hence marriage should not be advised unless at least 2½ years' continuous systematic treatment has been strictly followed and an interval of at least a year elapsed without treatment and without any recurrence of symptoms.

TREATMENT OF ACQUIRED SYPHILIS.

Throughout the entire course of treatment of syphilis it is important to bear in mind the fact that the patient must be treated as well as the disease. The treatment should consist of hygienic, tonic, dietetic, local and often climatic, as well as antisymphilitic measures. When the patient presents himself during the stage of the initial lesion, he should be kept under careful observation and his general health be put in the very best possible condition, giving him reconstructive tonics if necessary, correction of any gastrointestinal disturbances, the skin kept active by frequent warm baths or sponging, followed by vigorous rubbing, the use of alcoholics interdicted, unless he be an alcoholic habitue, in which instance the amount should be gradually lessened. The use of tobacco should also be prohibited. They should

be instructed to eat wholesome, nourishing, and easily digestible foods, which should be taken at regular intervals, plenty of fresh air and exercise, and indulge in long hours of sleep. The teeth should be carefully examined so as to remove all local sources of irritation in the mouth, sharp edges should be made smooth, carious teeth removed or their cavities filled, and the buccal cavities put in the best condition thus eliminating a great source of annoyance. The conditions of the kidneys should be determined at this time by microscopic and chemical examination of the urine. The presence of oxalates, phosphates in excess in the urine, indicating some impairment of metabolism, should be corrected by suitable diet and exercise. Glycosuria, if present, is no cause for alarm, as it usually disappears under specific treatment. Tendencies toward tuberculosis, rheumatism, gout, catarrh, and affections of the nervous system should be inquired into, and means taken to prevent their development during the course of treatment. Loss of weight should be combated by the usual measures.

The specific treatment should not be begun until the appearance of the secondary manifestations, which excludes every possible doubt or suspicion of the nature of the infection. Of course, there are several exceptions to this rule, e.g., where the situation of the chancre is conspicuous, where there is danger of the infection being conveyed to others, and in instances in which there is interference in the function of a part, or when the disease is acquired during pregnancy.

It is absolutely futile to attempt to abort syphilis by instituting specific treatment, with the onset of the initial lesion, as it has been tried repeatedly by various observers until it is now utterly condemned.

The COURSE of treatment should be continued for $2\frac{1}{2}$ to 3

years. The various METHODS of systemic treatment are: the continuous or tonic, the *intermittent*, *symptomatic or expectant*, and the *continuous systematic methods*. As to the mode of administering the medicinal remedies, in any of these methods they may be given internally, externally or combined.

CONTINUOUS TREATMENT, advocated by Keyes and Hutchinson, may be briefly described as follows:

The drug is pushed to the point of tolerance, the dose slightly reduced until the active symptoms subside. Tonic dose is continued until the end of the second year then mixed treatment for the remaining 6 months.

SYMPTOMATIC TREATMENT. Treatment of each symptom, exacerbation, recrudescence or relapse of the disease. When these are controlled tonic treatment is begun, this form of treatment is not recommended.

INTERMITTENT TREATMENT advocated by Fournier. Mercury for about two months until the symptoms are controlled, then an interval of 2 or 3 months, hygienic and tonic measures only at the sixth month. The mercurial treatment is resumed for another 2 or 3 months then an interval of 3 months, at the end of the first year or during the second year, 2 or 3 courses are given. Mercury may be given by the mouth but is slower and less certain, therefore, may be insufficient and may cause stomatitis and gastro-intestinal disturbances. Protiodide is the best. If ptyalism or intestinal irritation occur, mercury with chalk in $\frac{1}{2}$ gr. doses. (Hutchinson.)

Bichloride $\frac{1}{12}$ gr. may be used.

THE CONTINUOUS SYSTEMATIC method as advocated and taught by Horwitz is probably the best and most logical plan of treatment and will be considered later.

The ENDERMIC METHOD, that by inunction, is rapid, spares

the gastro-intestinal tract, but is dirty and troublesome and often causes eczema and stomatitis.

In the prodromal or waiting period anemia may be present in which case the patient should be treated by the administration of iron and arsenic. Chloride, and citrate of iron are particularly of value. Basham's mixture and preparations of peptones of iron and manganese are also of value. If this anæmic condition persists with the onset of the secondary symptoms, they should supplement the specific treatment. Any nervous debility should be counteracted by prescribing extract of malt to be taken during meals. Cod liver-oil is also of value in many cases. Sometimes a sedative effect of the nervous system will be obtained by the use of a galvanic current. Insomnia which sometimes occurs, must also be attended to. Mucous membranes of the throat and mouth should be carefully watched, and the development of any lesion actively treated.

Affections of the scalp, eye, ear, and nails, must be treated by direct mercurial medication. The treatment by the mouth or by inunction (preferably the former), when begun in the early period of syphilis should be persisted in, alternating it at definite intervals with any of the methods suggested, which will be considered later in more detail.

CONSTITUTIONAL TREATMENT.

The signal for beginning the regular course of treatment is the appearance of the cutaneous syphilides and the general adenopathy. The salt which is most easily assimilated, best borne by the patient and causing the least amount of gastro-intestinal disturbances should be the one selected by the physician. The specific agent used universally is mercury which may be given by the mouth, inunctions,

by fumigation, hypodermatic injections and intravenous injections. The preparations of mercury which have given satisfaction in the therapy of syphilis are the protiodide, the tannate, the green iodide (hydrarg. iod. viride), the biniodide, and the bichloride of mercury.

By the mouth.—The protiodide is usually given in the dose of $\frac{1}{4}$ to $\frac{1}{2}$ of a gr. three times a day, and is less likely to cause salivation than the tannate. The use of calomel and blue mass are less satisfactory owing to their liability to cause salivation. The disadvantage in the use of bichloride is that it very often produces pain and griping, and irritation in the gastro-intestinal tract, when taken by the mouth. No two forms of syphilis will be found precisely alike in their manifestations and idiosyncrasies, therefore, no definite outline of treatment can be formulated. It is easy, however, to obtain information as to the patient's tolerance of the drug, and then the principles of the general treatment can be gauged according to the virulence of the symptoms. The initial dose of the protiodide of mercury is $\frac{1}{3}$ of a grain, but in most cases it may be increased in a few days to a grain or 1 grain and a half, or even more until the desired effect is obtained. Taylor wisely contends that combining mercury with opium is extremely dangerous, owing to the danger of inducing the opium habit. Combination of mercury with iodide of potassium is known as the *mixed treatment*, and is valuable, especially where there is an early development of cerebral symptoms, such as headaches, epilepsy, paralysis, etc., or where the tertiary lesions attack the viscera and deeper structures. The occurrence of rheumatoid pains and gummatous infiltrations, particularly in the region of the mouth, necessitates immediate administration of mixed treatment. This will be given consideration later.

After the degree of susceptibility or tolerance to the drug is obtained, the *tonic dose* is determined by reducing this amount just $\frac{1}{2}$ which is the quantity of mercury, the patient is to continue with, during the whole course of treatment. The susceptibility of the patient to mercury must be determined from the outset. Beginning with about $\frac{1}{3}$ grain protiodide, three times a day, it is gradually increased. The symptoms which indicate the degree of tolerance to mercury are: tenderness of the gums and diarrhœa, with more or less colic. When the tonic dose is decided upon, a lapse of about a week should intervene before the course of treatment is begun, so as to give the system time to recover itself from the effects of the over-dose. After a course of six months' medication without the development of any serious complications, it is presumed that the patient is on his way to recovery. Some patients exhibit untoward effects of mercurials by the mouth, in which case employment of hypodermic injections of bichlorides of mercury are very efficient. Frequent warm baths must not be overlooked, so as to keep the skin healthy and active. The CONTINUOUS SYSTEMATIC course of treatment is as follows: At the end of the first three months if the patient's condition is satisfactory, treatment by the mouth may be discontinued and an inunction used daily for the next two weeks, and then taking by the mouth, the tonic dose given, for the next three months. At the end of the second period, there should be another interval of two weeks during which time the mercury may be given by inunction or combined in small doses of iodide of potassium. The inunctions or hypodermic injection of mercury are however, more preferable during these intervals as it gives the stomach and intestinal tract a respite from the irritating effects that otherwise, inevitably, result from the

continued use of this drug. Sometimes the iodides may be given internally, and the mercury, externally by inunctions. This is especially indicated in the late secondary and tertiary lesions, particularly or in place of the inunction. Hypodermatic injections of the bichloride of mercury may be given. When this is given in conjunction with iodides internally it is also a form of mixed treatment. When the iodides are being administered, symptoms of iodism and gastric irritations must be noted. During the second year of the course of treatment, the treatment is practically the same. At the end of the second year medication by the mouth should be continued the remaining six months on the mixed treatment. The following prescriptions are of much value:

℞ Hydrarg. biniodidi gr. 2 to 3
 Potassi iodidi ʒ ½ to 1 ½
 Syr. Sarsaparilla ʒ iij.
 Aquæ q. s. ʒ vj.

Sig.: One tablespoonful three times a day, an hour after meals.

℞ Hydrarg. bichloride gr. ½ to 1
 Potassi iodidi ʒ ½ to 1
 Essence of pepsin ʒ iij.
 Aquæ q. s. ʒ vj.

Sig.: One tablespoonful three times a day, an hour after meals.

At the end of 2½ years the patient should be advised to take treatment for about 6 weeks each spring and fall for the next 4 or 5 years. During this time if there is no recurrence of any symptoms he may be considered practically cured. Marriage of a syphilitic should not be agreed to by the physician for at least 3 years after the date of infection. In the late secondary and early tertiary lesions attended with dry scaling, Donovan's solution (liquor arsenii et hydrargy iodidi) is of value, in doses from

5 to 8 drops, well diluted with water, an hour after eating. Fluid extract of cocoa and kola is a very excellent agent for its tonic effect upon the circulatory and nervous system. The elixir, of iron quinine and strychnine is also very beneficial to the entire economy, especially where there is a tendency to cachexia. Sometimes Basham's mixture combined with strychnine (1-40 of a gr.) is an excellent tonic.

In some cases of syphilis the treatment by the mouth must be actively supplemented by the use of hypodermic injections, inunctions, or fumigations, especially in infections of the deeper structures, e.g., the bones, joints, nervous system, eye, ear, viscera, and penis and testis. In these cases there is no definite formula. The iodides and the mercury must be pushed to their fullest extent, even to the point of ptyalism, so as to control the ravages of the disease. As a rule, patients who have been properly advised as to the dangers of the disease, and impressed with the extreme importance of their conscientious co-operation, usually react well to treatment and rarely develop any tertiary lesions. The treatment must be sufficient as well as efficient.

Mercury by inunctions is a very valuable method and simply consists in use of the official mercurial or blue ointment of a strength of 25 to 50 per cent., formula of which is as follows:

R	Unguent hydrarg.	5 ij
	Vaseline q. s.	5 j
	M. Div. chart No. 8 (use oil papers)		

Sig.: Rub the contents of one paper into the skin for fifteen minutes, daily as directed. Ten to twenty daily inunctions constitute an average course.

It is best to begin with $\frac{1}{2}$ dram either once daily or night and morning. While the patient is on this course of treatment his condition should always be carefully watched.

If he shows no evidences of mercurialism, or other untoward effects, but on the contrary his condition is benefited the treatment may be persisted in. By vigorous rubbing and friction with the hands, the mercury is introduced through the skin by the way of the sweat, hair, and sebaceous follicles into the lymph spaces and then absorbed. Thus the patient receives his mercury, the stomach is at rest, and is in more suitable condition for the digestion of foods, or other agents which the exigencies of his condition may require, such as tonics, iodides, etc. Before beginning the use of an inunction, the patient should be carefully instructed to take a warm bath. This should be followed by a vigorous rubbing with a Turkish towel, or where it is possible, Turkish or Russian baths can be taken in addition to these. Should they disagree with the patient in any way, the inunction must be discontinued. The patient may be taught to use the inunctions himself, or they may be given by a trained nurse or masseur. The technique is as follows: the contents of one paper should be vigorously rubbed into the skin employing both hands, for 15 to 20 minutes. The parts of the body selected for the use of these rubbings are the (1) inner surface of the thighs, (2) groins, (3) breast, (4) abdomen, (5) axilla, (6) arms, (7) popliteal spaces, (8) inner surface of the buttocks. Parts of the body not covered with hair should be given preference. This should be previously thoroughly cleansed with soap and hot water. At least a week should elapse before the inunction in one area is repeated. Where there are lesions, scalp, or in the beard, an ointment composed of white precipitate (10 to 20 per cent.), vaseline or oleic acid may be used. Parts should also be shaved and subjected to frequent shampooing and antiseptic lotions. Where the *inunctions* produce irritation, such as dermatitis, its use

must be desisted in. Where the inunctions in the ordinary manner are not practical the ointment may be spread upon a cotton flannel belt and worn around the body and thus the friction will be obtained by the patient walking or moving about. This is especially adapted to infants and children. The *contraindications* to the use of inunctions are: dermatitis, or other inflammatory skin diseases, stomatitis, and salivation, gastro-intestinal disturbances, insomnia, debility, febrile changes, and rheumatoid or articular pains. During the course of inunctions the patient should be instructed to wear the one set of underclothing for the week.

Mercurial fumigations constitute another useful method in the treatment of syphilis, especially during the secondary and even tertiary periods, and in infantile syphilis, but is less frequently employed than in former years. Fumigations of, or vaporization of mercury is useful in the treatment of obstinate superficial lesions, either in the late secondary or tertiary stage, and to expedite the appearance of the secondary cutaneous manifestations. It is of marked benefit in relieving the osseous and articular pains, headaches and neuralgias.

Its disadvantage for practical application is that it requires special devices and often expensive appliances. Different methods may be extemporized for the purpose, but is always troublesome and takes considerable time. Calomel and cinnibar are the agents most often used. From 20 to 60 grains of calomel is the usual amount for each fumigation. Cinnibar may be combined with it by means of the steam generated or moist heat, and together they are volatilized. The patient being stripped and enveloped to the neck in heavy blankets, he is seated on a chair with the lamp under it. This should last 20 to 30 minutes. Then the patient

should go to bed, and covered with the same blankets used in the fumigation process. These baths should always be taken several hours after meals. The bowels should be previously evacuated. The baths can be taken, as a rule, in the beginning, as often as three times a week.

The amount of calomel used depends upon its effect on the patient. If there are any signs of depression after the bath, the dose must be reduced. If it evidences no change, it may be continued. In most instances, these must be continued very long, but simply used to obtain a therapeutic effect. Untoward effects of the mercury must be carefully observed.

Hypodermic injections of mercury.—As a method of treatment in syphilis hypodermic medication is applicable in all stages, and phases of the disease, and is especially valuable for its rapid effect in emergency. The indications for its use are: where the mercury disagrees with the stomach and intestinal tract, or where it acts as a depressant, also when the mercury given by the stomach is followed by little or no effect on the lesions, and in patients in whom there is an extreme susceptibility to the drug, even in small doses. Hypodermic injections of the drug are as a rule tolerated, therefore, it is a measure which must be kept in reserve, and if for any reason the other methods fail it becomes an invaluable substitute. Where there is a general ¹debility, and where the inunctions are contraindicated, the hypodermic method may often be used with impunity. The best sites for these injections are the interscapular and post trochanteric regions. The best form of mercury given by the hypodermic injection is the bichloride, in doses from $\frac{1}{8}$ to $\frac{1}{2}$ a grain or even higher if necessary. Bichloride solution should always be *freshly made* and so compounded, that 10 drops of dis-

tilled water will represent $\frac{1}{4}$ of a grain of the contained salt. Commence with 5 minims of a 2 per cent. solution and increase up to 10 or 12, and then change to 5 minims of a 4 per cent. solution and increase up to about 10 minims, and make this the maximum dose. The more concentrated the solution the less will be the pain and irritation. When the eruption is active, use an injection every day until it has disappeared; but when the eruption is slight or seen very early, every other day usually suffices. The intervals are gradually lengthened until by the end of about ten months, only one injection is given each week and this is maintained until the end of $2\frac{1}{2}$ or 3 years. An ordinary hypodermic syringe may be used with the same technique as for other purposes. Injections may be given subcutaneously or intramuscularly in either instances where the selected part is covered with dense tissues. The number and intervals of the injection is gauged accordingly in each individual case. There may be more or less pain at the point of puncture, or at the site of the injection, with the sense of burning or itching, and the causing of distinct firm nodes. Abscesses rarely follow when the technique is thorough. The injection may be given intramuscularly (gluteal region) and under the deep fascia (intrascapular). Syringe should be detached after it is plunged into the tissues to be sure that no blood comes from a vessel. After the needle is withdrawn the part should be briskly kneaded or rubbed.

Soluble and insoluble salts are used. The insoluble have the advantage of more persistent effects and their injections are only needed at longer intervals. The soluble salts are more active but must be given daily or every other day. Calomel and the bichloride are considered by some as the best insoluble salt. The salicylate of mercury

is also efficient as an intramuscular injection. Frank Billings recommends its use as follows:

- R̄ Hydrarg. Salicylatis. gr. xxiv.
 Liq. Paraffin. ʒss.
 M. Sig.:—5 minims subcutaneously injected two or three times a week.

Calomel may be employed, viz.:

- R̄ Calomel 24 gr.
 Glycerine 2 drams.
 Water 2 drams.
 Dose 5 to 15 minims ($\frac{1}{2}$ to $1\frac{1}{2}$ gr.), every 5 to 15 days.
 Course ten to fifteen injections.

Lambkin's slightly modified cream of mercury is as follows:

- R̄ Hydrarg. (metallic) 1 dr.
 Lanolin, pure 2 dr.
 Parolene carbol. 1% 4 dr.
 Of this 5 m. are given by injection once a week.

Calomel may also be used in the place of bichloride, but is more liable to produce salivation, and stomatitis, than the bichloride. Gray oil (see list of formulæ at the end of this volume). Hypodermic intramuscular injections of the metallic mercury in the form of a cream as recommended by Lany, of Vienna.

THE SYMPTOMS OF MERCURIAL SALIVATION are: soreness in the gums, which is felt particularly in mastication, when cleaning the teeth and coming in contact with irritating substances. This condition is known as *gingivitis*. The gums are congested, swollen, and ulcerated especially at the margin of the teeth, softened and tender or painful. The patient feels sense of protrusion and looseness of the teeth. Sometimes the condition may be so extreme that the teeth actually drop out. They also complain of a

metallic taste in the mouth, the breath is always more or less offensive. The mucous membrane of the teeth, pharynx and tongue are congested. *Intestinal colic* and profuse *diarrhæa* also accompany this train of untoward or toxic effects of mercury.

The *ptyalism* may be so severe that the nearby lymphatics will be found swollen and painful. This condition sometimes goes so far as to render it difficult for the patient to open his mouth or to swallow, and as a consequence, constitutional and nervous disturbances intervene. When there is a general mucous involvement, the condition is spoken of as *stomatitis*. The treatment should be largely preventive. As soon as it is recognized, the mercury should be discontinued and substituted by a vigorous tonic. An astringent mild antiseptic mouth wash should be employed, using such solutions as chloride tannic acid, potassium of chloride, tincture of myrrh, common salt, or boric acid. The gums may be touched with nitrate of silver or sulphate of copper solution 5 gr. to the oz. or tincture of iodine or glycerine of tannic acid applied by a cotton swab or a brush is of much benefit. The aim should be directed towards eliminating the mercury, which is best accomplished by diaphoretics and the ingestion and plenty of milk and water as to keep the kidneys active. **Iodism**, or the condition of the untoward effect of iodine, instances where the dose has either been excessive, or where there exists an idiosyncrasy to the drug. The symptoms which may be mild or severe are: metallic taste in the mouth and throat, fetid breath, coryza, accompanied by the typical symptoms of cold in the head. The face may become flushed and swollen, also œdema of the pharynx, epiglottis [and glottis, resulting] in hoarseness, and disparage and a sense of burning and pain in

the throat. Fortunately, these extreme cases are rarely seen. The skin may also manifest the toxic effects of the iodides, by such conditions as derititis urticaria, and lesions strongly resembling the secondary syphilides. The digestive functions may be impaired by the continued use of the iodides.

Thermal baths in themselves have absolutely no specific value in the treatment of syphilis. The hot springs may be beneficial in their general hygienic and mental effects, but must be supplemented by the mercurials or iodides to obtain any effect.

The serum therapy of syphilis is still in its infancy, but up to this present time is of no use in any of the various stages of the disease.

PROGNOSIS.—In mild cases and in infants at the breast it is favorable. In the retarded form where the lesions are superficial, the out-look is also good. Where the eye and ears are affected, or where there are visceral changes, it is less favorable. Recurrence of any of these affections are common.

Intravenous injection is still in the experimental stage. With the knowledge at hand its use is not to be recommended.

SELECTED FORMULÆ.

Acute Urethritis.

- ℞. Sodii Bicarb.
 Sodii Bromidi,āā ʒss.
 Tr. Belladonnæ, ʒj.
 Aquæ Menthæ Pep.
 Syr. Acaciæ,āā ʒiij.
 M. Sig.—Tablespoonful every 3 hours, to be used during
 the first days of gonorrhœa.
- ℞. Copaibæ,f ʒj.
 Liq. Potassii,f ʒij.
 Ext. Glycyrrhizæ, ʒss.
 Spts. Ætheros Nitrosi,f ʒj.
 Ol. Gaultheriæ, gtt. xvj.
 Muc. Acaciæ,q. s. ad ʒvj.
 M. Sig.—Tablespoonful 3 times a day.
- ℞. Pulv. Alum, ʒiv.
 Pulv. Copaibæ, ʒiv.
 M. Sig.—Tablespoonful in a wineglassful water 3 times
 a day.
- ℞. Caps. C. C. and S.
 Salolis, gr. x.
 Oleoresinæ Cubebæ, gr. v.
 Bals. Copaibæ, gr. x.
 Pepsinæ, gr. j.
 M. Flat Caps., No. i.
 Sig.—One capsule 3 times a day after meals.

Chordee.

- ℞. Pulv. Opii, gr. ij.
 Camphoræ, gr. iv.
 Lupulin, gr. xv.
 Ol. Theobrom., q. s.
 No. I. Suppository.—Pass into the bowel at bedtime.

- ℞. Bals. Copaibæ.
 Spts. Ætheros Nitrosi, āā f ʒss.
 Pulv. Acaciæ, ʒij.
 Sacchari, ʒj,
 Spts. Lavender, f ʒij.
 Tr. Opii, f ʒi.
 Aquæ, q. s. *ad f* ʒiv.
 M. Sig.—Tablespoonful 3 times a day after meals.

Injectations in Acute Urethritis.

- ℞. Zinci Sulph., gr. xv.
 Plumbi Acetatis, gr. xxx.
 Tr. Catechu.
 Vin. Opii, āā f ʒi.
 Aq. Rosæ, q. s. *ad f* ʒvj.
 M. Sig.—Inject syringe-ful night and morning.
- ℞. Zinci Sulph., gr. xvj.
 Plumbi Acetas, f ʒss.
 Hydrastin (Lloyd's Colorless).
 Bismuth Subnit., āā ʒix.
 Tannin Glycerole.
 Muc. Acaciæ, āā ʒij.
 Aquæ, q. s. *ad f* ʒvi.
 M. Sig.—Shake well and inject night and morning.
- ℞. Plumbi Acetas, gr. xxx.
 Zinci Sulph., gr. xv.
 Hydrastin Sulph., gr. xij.
 Ext. Ergotæ Fld., f ʒiv.
 Tr. Opii, f ʒiij.
 Aquæ, q. s. *ad f* ʒvj.
- ℞. Zinci Chloridi.
 Zinci Iodidi, āā gr. ij.
 Aquæ, ʒviiij.
 Sig.—Inject syringe-ful night and morning, during convalescence. (*Belfield.*)

Orchitis and Gonorrhœal Bubo.

- ℞. Ichthyol.
 Ung. Hydrargyri.
 Ung. Belladonnæ,āā ʒij.
 Ung. Petrolei,q. s. *ad* ʒj.
- ℞. Guaiacol, ʒij.
 Resorcin, ʒiij.
 Lanolin, ʒi.
 M. Sig.—Apply topically on gauze.
- ℞. Iodoform.
 Ext. Belladonnæ.
 Ung. Hydrarg.,āā ʒi.
 Ung. Zinci Oxidi,q. s. *ad* ʒi.
 M. Sig.—To be used locally.

Subacute and Chronic Anterior Urethritis.

- ℞. Zinci Sulph. Carb., gr. xx.
 Bismuth Subnit., ʒi.
 Aquæ Dist., ʒviij.
 M. Sig.—Use freely as an injection after each urination.
- ℞. Zinci Sulph., gr. x.
 Bismuth Subnit., ʒij.
 Liq. Hydrastin (colorless), ʒss.
 Aquæ,q. s. *ad* ʒij.
 Sig.—Inject 3 times daily.
- ℞. Berberine Muriate, gr. viij.
 Aquæ, Oi.
 Sig.—Inject syringeful night and morning.

Finger's Ointment.

- ℞. Iodine (crystals), gr. vi.
 Kali Iodidi, gr. xxx.
 Ol. Amygdalæ, ʒi.
 Lanolin,q. s. ʒi.
 M. Sig.—Apply on bougie or by means of an applicator, tipped with cotton.

- ℞. Ichthyol, gr. xv.
 Bals. Peru, ʒi.
 Resorcin, gr. xl.
 Ol. Recini, ʒiv.
 M. Sig.—Apply locally through endoscope, or use as injection.

Unna's Ointment.

- ℞. Ag. NO₃, gr. v.
 White Wax, gr. x.
 Bals. Peru, ʒxxx.
 Cocæ Butter, ʒi.

Acute Cystitis.

- ℞. Belladon. Succ, gtt. xx.
 Sodæ Borax, ʒij.
 Acid Benzoic, gr. xx.
 Tr. Opii Camph., ʒi½.
 Ol. Gaultheria, ʒii.
 Syrup Simplex, ʒiv.
 Aq. Distil.
 M. S.—Tablespoonful in water 4 times daily.

Cystitis (Tubercular).

- ℞. Iodoform, ʒii.
 Liquid Petrolatum Sterilized, ʒvi.
 Sig.—Shake. Inject 3 ounces into the bladder and permit it to remain. Each time the patient urinates he should stop the flow as soon as oil appears. Injections should be repeated at intervals of two or three days.

Iodoform Emulsion.

- ℞. Iodoform, ʒvi.
 Gum Tragacanth, gr. xl.
 Alcohol, ʒxl.
 Aquæ, ʒviii.
 For nocturnal emission, enuresis, etc.

- ℞. Tr. Belladonnæ, ʒj.
 Ext. Ergotæ Fld., ʒiii.
 Sod. Bromid, ʒiv.
 Sy. Zingiberus, q. s. ʒiii.
 For nocturnal emission.

Aphrodisiac Pill.

- ℞. Quininæ Sulph.,
 Ferri Sulph., āā ʒij
 Ext. Nucis Vomica, gr. vi
 Zinci Phosphide, gr. ij
 M.—Flat Caps., No. xl.
 Sig.—One caps., t. i. d.

Gonorrhœa in the Female.

- ℞. Plumbi Acet.,
 Zinci Sulph.,
 Alum Pulv.,
 Tannin,
 Aquæ, Oj.
 M.—Vaginal injection.

**Vaginal Suppository in the Convalescent Stage
 of Gonorrhœa.**

- ℞. Alum Pulv.,
 Plumbi Subac. Cerat.,
 Ol. Theobromæ, q. s.
 Ft. Suppository No. 12.
 Use one night and morning.
- ℞. Potass. Bicarb., ʒj.
 Tr. Hyoscyam.
 Kavæ Kavæ Ext. Fld., āā ʒj.
 Aquæ, q. s. ut. ft. f ʒviii.
 M.—Tablespoonful in a wineglassful of water, 3 times
 daily.

Lubricant for Sounds and Bougies.

(Hyde and Montgomery.)

R̄. Tragacanth,.....	gr. xxx.
Glycerin,	℥ijss.
Ac. Carbolici,	℥xx.
Aq. Distill.,	q. s. ad ℥iij.

Phosphaturia.

R̄. Ac. Nitric dil.,.....	℥i.
Zacch. Alba.,.....	℥ss.
Pepsinæ,	gr. xxiv.
Aquæ,	q. s. ad ℥iss.
M. Sig.—Thirty drops in water with meals.	

R̄. Strychniæ Sulph.,.....	gr. i.
Ac. Arsenosi,	gr. i.
Salolis,	℥i.
Pepsinæ,	gr. xx.
M.—Flat Caps., No. xx.	
Sig.—One Caps., t. i. d.	

SYPHILIS.

R̄. Mass Hydrarg.	
Ferri Sulph.,	℥℥ ℥j.
Pulv. Opii,	gr. x.
Quiniæ Sulph.,	℥ij.
M.—Ft. pil. xl.	
Two pills 3 times daily when patient is debilitated.	

R̄. Hydrarg. Iodid. Vir.,.....	gr. v.
Antim Et. Pot. Tart.,	gr. j.
Pulv. Opii,	gr. v.
M.—Ft. pil. 30.	
One pill 4 times daily when patient is robust.	

Hypodermic Injection in Syphilis.

GRAY OIL is an emulsion of metallic mercury, made as follows: Mix thoroughly lanolin with chloroform, allow ch. to evaporate by trituration and adding 2 parts to 1 part semifluid lanolin. 1 part of the resulting salve added to 3 parts olive oil constitutes gray oil.

- ℞. Hydrarg. Chlor. Cor., gr. ½.
 Tr. Ferri Chlor., ʒij.
 Liq. Arsenici chlor., gtt. xxxvj.
 Acid Hydrochlor. Dil., ʒj.
 Syr. Sarsaparillæ Co., }
 Aquæ, } aa ʒiij.
 M.—Tablespoonful in water 3 times daily, to be given
 when the patient is debilitated.

- ℞. Hydrarg. Chlor. Cor., gr. iv.
 Benzoin, ʒ½.
 Cologne Water, ʒj.
 Rose Water, q. s. ad ʒvj.
 M.—Use locally.

Tonics.

- ℞. Acid Arsen., gr. j.
 Strychnine Sulph., gr. ¼.
 Ferri Sulph., ʒj.
 Quiniæ Sulph., ʒj.
 M.—Ft. pil. no. 20.
 One pill 3 times daily.
- ℞. Ferri Reduct.
 Quiniæ Sulph., ʒj.
 Ext. Nucis vom., gr. x.
 Rhei. Pulv., ʒi.
 Belladonnæ Ext., gr. iij.
 M.—Liv. in pil. 20.
 Sig.—One after each meal.

Alopecia.

- ℞. Spts. Ammon. Aromat., f ʒj.
 Glycerinæ, f ʒss.
 Tr. Cantharid., f ʒj.
 Aquæ Rosmarin., f ʒvij
 M.—Apply to scalp morning and evening.
- ℞. Ext. Jaborandi.
 Tr. Canthar., }
 Glycerin., } āā ʒss.
 Vaseline, ʒiss.
 M.—Apply locally with a sponge morning and evening.

Syphilitic Eruptions.**Tertiary Syphilis.****MIXED TREATMENT.**

- ℞. Hydrarg. Chlor. Cor., gr. j.
 Potass. Iodid., ʒij.
 Syr. Ferri Iodid., ʒiv.
 Syr. Sarsaparillæ Co., }
 Aquæ, } āā f ʒiiij.
 M.—Tablespoonful in water 3 times daily.
- ℞. Tr. Ferri Chlor., }
 Acid Phos. Dil., } āā ʒss.
 Syr. Simp., f ʒiii.
 M.—A teaspoonful 3 times daily.
- ℞. Ferri Sulph., gr. ij.
 Magnes. Sulph., ʒj.
 Acid Sulph. Dil., ℥x.
 Ing. Quassii, ʒj.
 M.—Tablespoonful in water 3 times daily.
- ℞. Tinct. Cantharid., f ʒiss.
 Tr. Capsici., gtt. xx.
 Glycerin., ʒj.
 Cologne Water, ʒi.
 M.—Use on the scalp at night.

**Stimulating Lotions and Ointments to Apply to
Granulating Surfaces and Ulcers.**

- ℞. Cerat. Resin. Co., ʒj.
 Balsam Peruvian, ʒij.
 Iodoform, ʒj.
 Ung. Petrolei, ʒj.
 M.—Use locally.
- ℞. Ung. Hydrarg. Nit., ʒj.
 Pulv. Jalapæ, ʒj.
 Balsam Peruvian, ʒj.
 Ung. Zinc Ox., ʒj.
 M.—Ft. ung. Use locally.
- ℞. Ung. Hydrarg. Nit., ʒj.
 Cosmolin, ʒj.
 M.—Ft. ung. Use locally.

Lotions for Chancre and Chancroid.

- ℞. Cupric Sulph., gr. iv.
 Aquæ, ʒj.
 M.—Use locally.
- ℞. Argent. Nit., gr. ij.
 Aquæ Destil., ʒi.
 M.—Use locally.
- ℞. Acid Nitric, gtt. ij.
 Aquæ, ʒi.
 M.—Use locally.

Red Wash.

- ℞. Zinc. Sulph., gr. x.
 Spir. Rosmarin., ʒiss.
 Tr. Lavend. Comp., ʒij.
 Aquæ, f ʒx.
 M.—Use locally.

Yellow Wash.

- ℞. Hydrarg. Chlor. Cor., gr. j.
 Liquor Calcis., f ʒj.
 M.—Use locally.

Black Wash.

- ℞. Hydrarg. Chlor. Mite., 3j.
 Liquor Calcis, f 3iv.
 M.—Bottle to be well shaken before using.
- ℞. Tannin, gr. iij.
 Ex. Opii, gr. ij.
 Cupric Sulph., gr. ½.
 M.—Use locally.
- ℞. Calomel, 3j.
 Bis. Subnit., 3ij.
 Talcum, 3j.
- ℞. Ac. Salicylic, gr. xv.
 Hyd. Chlor. Mite., 3ij.
 Bals. Peru, 3j.
 Tr. Benzoin, gr. xxx.
 U. Z. O., 3j.
 Sig.—Useful for stimulating indolent venereal sores.
- ℞. Ac. Carbol., gr. iv.
 Zinc. Sulph.
 Pulv. Alum, āā gr. xij.
 Aquæ, ... q. s. 3iv.
 Or
 CU So 4, gr. iv.
 To Aquæ, 3j.
- ℞. Calomel, 3j.
 Bals. Peru, 3½.
 U. Z. O., 3j.

Gargles.

- ℞. Acid Tannic, 3ij.
 Spir. Vin. Rect., 3j.
 Mistura Camphoræ, f 3x.
 M.—Gargle.

- ℞. Potass. Chlor., ʒj.
 Tr. Cinchon. Compl.,..... }aa ʒij.
 Tr. Guaiaci Ammon., }
 Mel Dest., ʒj.
 Aquæ,q. s. ut. ft. ʒiv.
 M.—Ft. gargle.
- ℞. Potass. Chlor.,..... ʒi½.
 Tr. Ferri Chlor.,..... ʒiiij.
 Listerin,f ʒiv.
 M.—Pour half an ounce in half a glass of water, and
 use as a gargle.
- ℞. Potass. Chlor., ʒij.
 Listerin, ʒj.
 Ol. Gaultheriæ,..... gtt. vj.
 Syr. Simp.,..... ʒi.
 Aquæ Distil., ʒij.
 M.—Gargle.

Mouth Washes for Mucous Patches.

- ℞. Acid Pyrolig., ʒj.
 Aquæ, ʒviiij.
 M.—Wash mouth every 4 hours.
- ℞. Tinct. Myrrh, ʒ½.
 Potass. Chlor.,..... ʒiiij.
 Aquæ,f ʒiv.
 M.—Wash mouth every three or four hours.
- ℞. Ac. Tannici, ʒj.
 Potass. Chlor., ʒij.
 Ol. Gaultheriæ, gtt. vj.
 Aquæ, ʒvj.

List of Genito-Urinary Instruments Required for Office Use.

(From Morton and modified by the author.)

- Valentine irrigator.
- Keyes-Ultzman syringe
- Several glass hand syringes. Capacity 4 to 6 drams.
- Oberlander or Kollmann's dilator (antero-posterior).
- Otis's urethrometer.
- Bougies a bouëlè, metal, 16 to 32, omitting every other number.
- Sounds, steel, Van Buren curve, 16 to 34 F., every other number.
- Beneque sounds, 16 to 34 F., every other number.
- Gouley tunnelled, silver catheter, English with stylet, 10, 12, 14 and 16 F.
- Thompson stone searcher.
- Flexible bougies, smallest to 26 F. (alternate numbers).
- One dozen whalebone guides or filiforms.
- Cystoscope and ureteral catheters.
- Anterior and posterior endoscope—calibre 26 to 28 F.
- Sterilizer.
- Hypodermic syringe, with an extra needle especially adapted for intramuscular mercurial injections.
- Psychrophore.
- Soft rubber catheters { Jacques, or
Nelaton,
Soft rubber,
Mercier,
Coude and bi-coude.
- Irrigating bottle (graduated). 16 ounces.
- Three conical urine glasses and one (1) 8 oz. glass graduate.
- Microscopic outfit.
- Alligator urethral forceps for foreign bodies in the urethra.
- Laryngeal lamp and head mirror.
- Tongue depressor.
- Half dozen wire applicators (flexible) 10 to 12-in. in length with the end milled.
- Small magnifying glass.
- Pocket surgical set.
- Several white basins.
- Urinalysis set.
- Vaginal speculum.
- Static cooler (Kemp's).
- Static massage instrument (Pezzole).

101 QUESTIONS.

1. Symptoms and treatment of acute anterior urethritis.
2. Symptoms and treatment of acute posterior urethritis.
3. Differential diagnosis of chronic anterior and posterior urethritis.
4. Complications of acute anterior urethritis.
5. Complications of posterior urethritis.
6. Causes of chronic posterior urethritis.
7. Symptoms of seminal vesiculitis.
8. Symptoms of prostatitis.
9. Treatment of chronic urethritis.
10. Treatment of gonorrhoea in female.
11. Complications of gonorrhoea in female.
12. What is peri-urethral phlegmon, cowperitis and folliculitis?
13. Describe Janet's treatment of acute urethritis.
14. What is a chancroid, its symptoms, complications and treatment?
15. Give the palliative, abortive and operative treatment of bubo.
16. What is the period of incubation of syphilis and what are its primary, secondary and tertiary symptoms?
17. What are the emergencies of syphilis?
18. Give the treatment of the primary, secondary and tertiary stages.
19. What is meant by Colles and Profeta's laws.
20. Symptoms of congenital syphilis and treatment.
21. Give the law governing syphilis and marriage.
22. Differential diagnosis between chancroid, chancre, and herpes.
23. What is a mucous patch, condylomata and treatment of each.
24. How would you treat venereal warts.
25. Symptoms and treatment of orchitis.
26. Give the classification of skin eruptions in secondary syphilis.
27. What is Dittels crisis.
28. Give the methods of diagnosing stone lodged in upper portion of ureter.
29. Give the symptoms and treatment of chronic pyelitis.
30. What is surgical kidney.

31. Describe the surgical treatment of Bright's disease (chronic).
32. Symptoms and treatment of rupture of the bladder.
33. Symptoms and treatment of stone in the bladder.
34. Symptoms and treatment of papilloma of the bladder.
35. What are the different forms of cystitis.
36. Treatment of chronic cystitis with alkaline urine.
37. Treatment of tubercular cystitis.
38. Symptoms of hypertrophy of the prostate gland.
39. Describe the palliative treatment.
40. Give the indications for a perineal, supra pubic, perineal and supra pubic combined, and the Bottini operation.
41. What directions would you give regarding daily catheterization.
42. What is orchidectomy and what is phimosis.
43. What is paraphimosis and give treatment.
44. How does the character of hematuria assist in locating the cause of hemorrhage.
45. Describe continuous catheterism and when is it indicated.
46. What is evacuating catheterism.
47. Describe the operation of amputating the penis.
48. What incision would you make for a lumbar nephrectomy.
49. What incision would you make for an abdominal nephrectomy.
50. What incision should be made in order to resect the ureter.
51. What is atonic impotence and name the different types of impotence.
52. What is psychical impotence.
53. How would you treat frequent nocturnal pollutions.
54. How would you treat enuresis.
55. What are the different forms of stricture.
56. What is meant by a stricture of large calibre, of small calibre.
57. How diagnose stricture of the urethra.
58. What are the symptoms of stricture of the membranous urethra.
59. Give the different methods of treatment of stricture of the urethra.
60. Symptoms and treatment of extravasation of urine.
61. Symptoms, causes and treatment of retention of urine.
62. Give indications for the different methods of operating for relief of urethral strictures.
63. How would you sterilize urethral instruments, rubber and steel.
How would you sterilize cystoscope and ureteral catheters.

65. What are the causes, symptoms and treatment of varicocele.
66. Give classification of hydrocele and palliative treatment.
67. Describe treatment of congenital and infantile hydrocele.
68. Describe treatment of hydrocele of the cord.
69. Give the differential diagnosis of hydrocele, chronic orchitis, varicocele, and hernia.
70. Symptoms of suppression of urine.
71. Symptoms and causes of uremia.
72. Symptoms and forms of urethral fever.
73. Give the differential diagnosis between uremia, retention and suppression of urine.
74. Causes of undescended testicle; treatment.
75. Give the methods of determining the functional activity of a supposed diseased kidney.
76. How prepare a patient for a suprapubic cystotomy.
77. Causes, symptoms and treatment of movable kidney.
78. Give the symptoms, diagnosis and treatment of stone in the kidney.
79. What are the various operations performed on the kidney.
80. Describe the Van Hook's operation.
81. What is epispadias, hypospadias.
82. What is exstrophy of the bladder.
83. What are the varieties of initial lesion.
84. What are the indications for retrograde catheterization.
85. Describe the technique and uses of the cystoscope.
86. Describe the technique and uses of the endoscope.
87. Describe Doyen's operation.
88. How would you treat tubercular epididymitis.
89. Give the different methods of treatment in secondary syphilis.
90. Give differential diagnosis of gonorrhoeal and simple rheumatism.
Describe the course by which infection is conveyed from (a) the epididymis to the prostate, (b) from the seminal vesicles to the testicle, from urethra to the kidney.
91. Describe briefly the anatomy and physiology of the urethra.
92. How is fluid in the scrotum prevented from extravasating into the abdomen.
93. Describe the two glass urine test, and what knowledge is obtained by it.
94. Name the causes of sterility.

95. What is meant by cryoscopy. Give the principles of its applications and state its uses.
96. What are the advantages of hypodermic medication in syphilis.
97. Give the contraindications to the use of the mercury by inunction.
98. Describe the treatment of tuberculous cystitis.
99. What are the usual complications of stricture and hypertrophied prostate of long standing.
100. What is meant by segregation of the urine—and how is it accomplished.
101. Describe the usual symptoms of hereditary syphilis.

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